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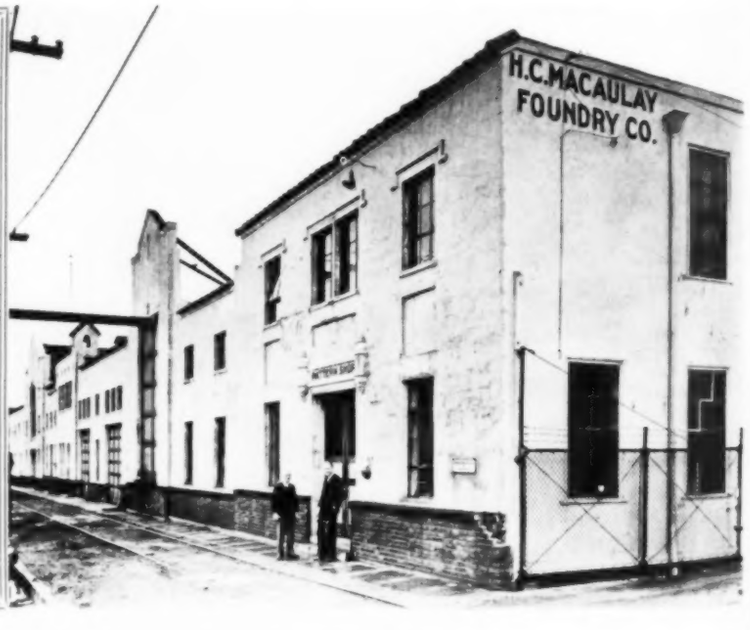

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THE FOUNDRY

EDITORIAL

Defense Presents Challenge To Foundry Industry

IN THE mobilization of the nation's resources and industrial facilities to produce the necessary war materials for America and the British Empire, basic industries are finding it necessary to meet record demands under conditions requiring the greatest of ingenuity and resourcefulness. This is especially true in the foundry industry where the demand for both ferrous and nonferrous castings is increasing constantly in the face of greater difficulties in obtaining certain raw materials.

The present situation provides the manufacturers of castings with both a duty and an opportunity; a duty to the government in meeting quickly and to the fullest extent the needs of the army and navy for castings of every description; and an opportunity to the industry in extending the use of castings in every possible way. In this day of shortages in materials and equipment, and the need for "substitutes," castings offer the designing engineer an excellent product capable of meeting exceptionally difficult service requirements.

Events at the New York convention seem to indicate that at least a portion of the foundry industry at last has become aware of the tremendous changes being wrought by the steady progress of the defense effort. If foundrymen are to be successful in meeting the challenge, the industry must present a united front in its contacts with Washington.

A Record of Service

THE announcement made during the New York convention that C. E. Hoyt is relinquishing his duties as executive vice president and treasurer of the American Foundrymen's Association to devote all of his time to the work of exhibit and convention manager, calls attention to a record of service probably unique in the history of trade and technical associations. Few groups have been privileged to receive such uninterrupted leadership and few men have had the pleasure of directing a technical association of a basic American industry for so long a time.

During the convention, Mr. Hoyt was accorded several tokens of appreciation by the membership of the association, culminating with the award of the Joseph S. Seaman gold medal "In recognition of his work in the development of the American Foundrymen's Association and for his exceptionally outstanding service to the foundry and allied industries." Expression of appreciation of an industry was voiced as follows by Past President Henry S. Washburn in making the medal presentation:

"Charles Edgar Hoyt was born in Wayland, Mich. He came from a family of foundrymen and for a time was associated with his father in operating a foundry and machine shop. He then became associated with the Michigan State College at Lansing and left there to join the engineering faculty of Lewis Institute in Chicago.

"In 1907 and 1908 he staged two-day conventions and exhibits at the institute which attracted the attention of national organizations. He was one of the signers of the application for a charter when this association was incorporated, was elected a director and his years of service to our association have not been interrupted since that time.

"The board of awards and the directors do not bestow this award because of the invention of a new process or because of the compilation of a technical paper or papers. The award is made in recognition of quality of service rendered to our association during the past years. Mr. Hoyt has taught us the meaning of unselfish service. Possessing the highest attributes of a Christian gentleman, he has attracted to himself and to our association some of the finest men in our industry. He has had the gift of being able to share his sterling character with his associates and we are the better because of our close contacts with him.

"Ed, the American Foundrymen's Association has much to demand of you in the future, but we make a pause in your continuing years of service to honor ourselves by honoring you. With the respect, with the affection, and with the heart-felt appreciation of a grateful membership, we present to you the Joseph S. Seaman gold medal."

Frank G. Steinebach
Editor

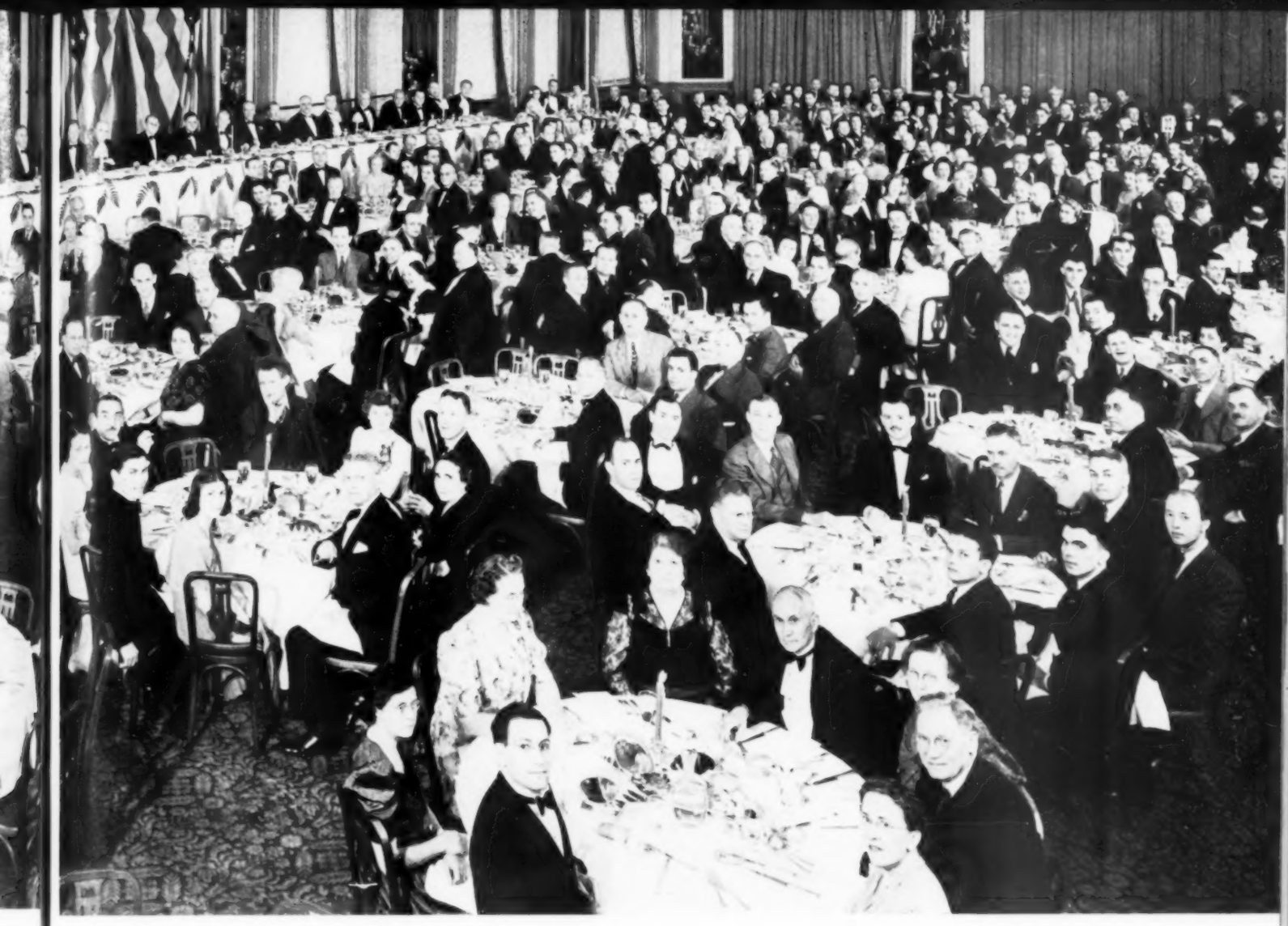
A ★ F ★ A

CONVENTION SHOWS INDUSTRY MEETING DEFENSE DEMANDS

THAT the foundry industry is making every effort to meet present and future demands developing from the national defense effort was shown clearly in both formal and informal discussions at the forty-fifth annual convention of the American Foundrymen's Association held at the Hotel Pennsylvania, New York, May 12 to 14. In addition to the regularly scheduled sessions devoted to the consideration of problems of production and management, representative castings producers in the nonferrous industry met on special call Wednesday afternoon to study and plan action on the situation now facing that industry with reference to shortages of basic raw materials. Importance of these and other problems was a factor in attracting the largest number of members and guests ever to attend a purely technical convention of the association. During the week, approximately 1700 men and women were in New York to participate in the convention activities.

High spot of the week was the annual business meeting held Wednesday morning. President Lester N. Shannon in his annual address pointed out that in this critical period of the nation's history the fundamental work of the A.F.A.—improvement and development of the casting industry along lines of technical control, manufacturing methods, equipment and shop processes—has been of great importance in placing the foundry industry on a footing whereby it can do its share in the nation's industrial preparedness program.

Mr. Shannon said that the 21 chapters of the association can play an important part in en-



abling members to receive information on problems involved in the national defense program, and cited the work of the Ontario chapter in aiding its members in their intense efforts as a part of the British empire. He mentioned that during the past year rapid increase of membership had advanced the role from 3380 to 4120, an all-time record. Mr. Shannon stressed the educational facilities of the association in preparing trained personnel for the industry which are available through apprenticeship, foreman and other training committees.

C. E. Hoyt, executive vice president of the A.F.A., in his report, stated that the financial condition of the association was in excellent shape, and that three new chapters had been added during the year. He commented on the various technical committees, mentioning that the one on cupola research was the most recently formed. Mr. Hoyt said that safety and hygiene codes developed by the A.F.A. were being used as guides in formulating various state industrial codes, and pointed out that work of the association in the state of Illinois had reduced insurance rates from a previous rate of $5 per $100 of payroll to as low as $2.80 in some cases.

Mr. Hoyt announced that the invitations of the Northeastern Ohio Chapter of the A.F.A. and the city of Cleveland had been accepted by the board of directors and that the 1942 annual convention and exhibition of the American Foundrymen's Association will be held in Cleveland the week of April 20. The exhibition of foundry equipment and supplies will be staged in Cleveland's Public Auditorium, scene of the 1938 show.

At the close of his report, Mr. Hoyt stated that he is relinquishing his duties as executive vice president and treasurer and that the board of directors had appointed C. E. Westover, manager of operations, Burnside Steel Foundry Co., Chicago, to succeed him in those positions. Mr. Hoyt will continue in the capacity of exhibit and convention manager of the association.

Robert E. Kennedy, secretary of the A.F.A., presented the report of the nominating committee, and stated that since no further nominations had been received, as provided in the by-laws, the following were declared elected: President, Herbert S. Simpson, president, National Engineering Co., Chicago; vice president, Duncan P. Forbes, president, Gunite Corp., Rockford, Ill.; and directors for a three term—Lester N. Shannon, vice president, Stockham Fittings Co., Birmingham, Ala.; W. J. Corbett, vice president, Atlas Steel Castings Co., Buffalo; M. J. Gregory,

factory manager, Caterpillar Tractor Co., Peoria, Ill.; R. J. Allen, consulting metallurgist, Worthington Pump & Machinery Corp., Harrison, N. J., and J. G. Coffman, vice president, Los Angeles Steel Casting Co., Los Angeles.

Fred A. Melmoth, vice president, Detroit Steel Casting Co., Detroit, and chairman of the prenominating presented the following as the nominating committee for officers for the 1942 convention: M. F. Doty, Clark Equipment Co., Buchanan, Mich.; S. C. Wasson, National Malleable & Steel Castings Co., Indianapolis; E. F. Hess, Ohio Injector Co., Wadsworth, O.; and Lee E. Everett, Kaukauna Machine Corp., Kaukauna, Wis.; Alternates—S. V. Wood, Minneapolis Electric & Steel Casting Co., Minneapolis; W. D. MacMillan, International Harvester Co., Chicago; T. C. Watts, Falcon Bronze Co., Youngstown, O.; and C. J. Lonnee, Muskegon Piston Ring Co., Sparta, Mich.

Gold Medal Awards Presented

Frank G. Steinebach, chairman of the international relations committee of the A.F.A. read a radiogram of best wishes for a successful convention from the Australian Foundrymen's Association. Mr. Kennedy then announced the prize winners in the national indentured apprentice contest in gray iron, steel, nonferrous castings and in patternmaking. Names of the winners are presented on page 119 of this issue.

Following that he stated that the association had awarded honorary life memberships to Henry M. Lane, Detroit, and to retiring president Lester N. Shannon, Henry S. Washburn, chairman of the board of awards then reported that the board had awarded four gold medals of the A. F. A. in recognition of service to the foundry and allied industries and to the association. He called upon T. S. Hammond, Whiting Corp., Harvey, Ill., to present the Whiting medal to Don. J. Reese, International Nickel Co., New York; on Hyman Bornstein, Deere & Co., Moline, Ill., to present the McFadden medal to Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.; on G. H. Clamer, Ajax Metal Co., Philadelphia, to present the Penton medal to Fred L. Wolf, Ohio Brass Co., Mansfield, O.

Given Letters of Appreciation

Mr. Washburn presented C. E. Hoyt, retiring executive vice president of the A. F. A. first with a bound volume of letters of appreciation from officers and past officers of the association, and followed this with the presentation of the Seaman gold medal. Mr. Hoyt, in his response to the medal presentation, made a unique gesture by presenting bronze replicas of the Seaman medal to his associates and co-workers in the home office, Robert E. Kennedy, Jane Reininga, E. O. Jones and Norman F. Hindle.

Annual awards address was presented by S. Wells Utley, Detroit Steel Castings Co., Detroit, and past president of the association. Speaking on "This Industry of Ours," Mr. Utley stated that if the measure of human progress was the amount by which the condition of the great multitude has been raised by prosperity, leisure and happiness; by the increased facility the average man has for improving the position of those whom he loves and who are dependent upon him, then industry of which we are all a part has had more to do with progress than any other one factor.

Culmination of the social activities was the annual dinner of the association which took place Wednesday evening in the ballroom of the Hotel Pennsylvania. Approxi- (*Please turn to page* 98)

Excellently arranged program of sessions at the annual convention brought members and guests from all over the United States and Canada. Photos on left courtesy of Sterling Farmer, Sand Products Corp., Cleveland, and those below courtesy of Bradley H. Booth, Jackson Iron & Steel Co., Jackson, O.

STEEL CASTINGS *Aided by*

By E. C. TROY
Metallurgist
Dodge Steel Co., Philadelphia

POURING liquid steel into a sand cavity does not suggest a really difficult task. The foundry engineer is not perturbed at transferring the liquid to the mold, for this is but a small part of his daily job. His work begins with preparation of the patterns, molds and metal for pouring. It is in those intricate tasks that science has armed him with helpful tools. Details have been written elsewhere citing the interesting developments of control in the manufacture of steel castings. This is but a brief explanation of the adaptability of science to the industry.

Entering an industry wrapped in centuries of lore and hindered at first by a skeptical and secretive foundry tradesman the foundry engineer has been able to improve his product almost beyond recognition. The application of science to the control of the many variables which at one time were handled by the rule of thumb is now routine from choice of raw materials entering to uniformity of product leaving the foundry. The ceramic, chemical, electrical, mechanical and metallurgical engineers all contribute to the production of a steel casting.

The modern steel foundry generally is subdivided into departments and an attempt will be made to cite the aids of science to each. The blueprint of the designing engineer becomes a wood, metal or plaster model in the pattern shop. Absolute accuracy of work is imperative. Allowances for shrinkage of the hot metal and draft for easy removal of the pattern must be made. Accuracy has been improved by the production of new and better pattern materials and mechanical tools, but it is through use of the laws of physics governing the behavior of liquid metals that the greatest aid has been given to the pattern designer.

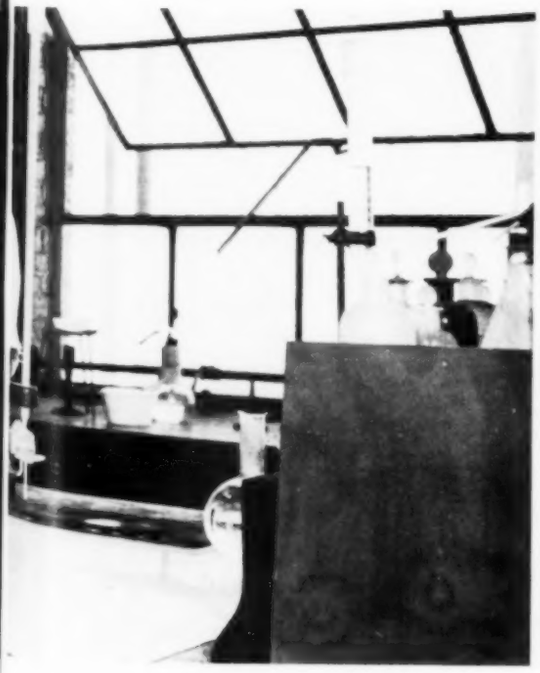
Because steel in transforming from a superheated liquid to a solid at room temperature undergoes three stages of diminishing volume it is necessary to make allowances for both liquid

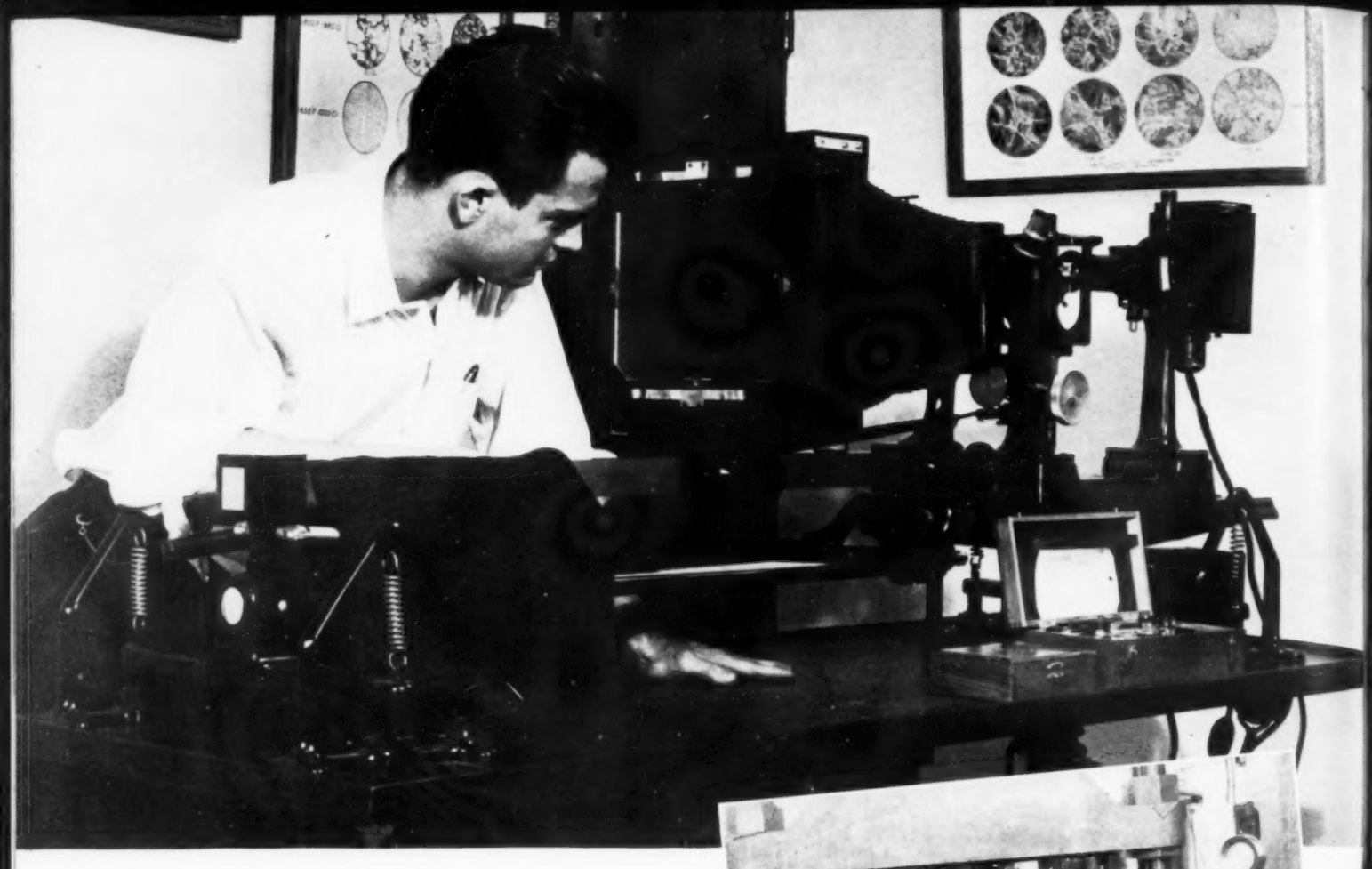
PRODUCTION *Science*

and solid shrinkage. The production of castings free from internal cavities and true in final dimensions depends entirely on a knowledge of the laws governing these changes.

Sand, the medium of molding, has been classified as to its grain shape and size together with other of its physical and chemical properties. No longer is it necessary for the foundry to depend on a doubtful source of supply. Present day sand control provides carefully blended sands and sand bonds mixed to

Fig. 1 (Left below)—The chemical laboratory is an important department in the steel foundry. Fig. 2 (Right) — Pulling a tensile test specimen





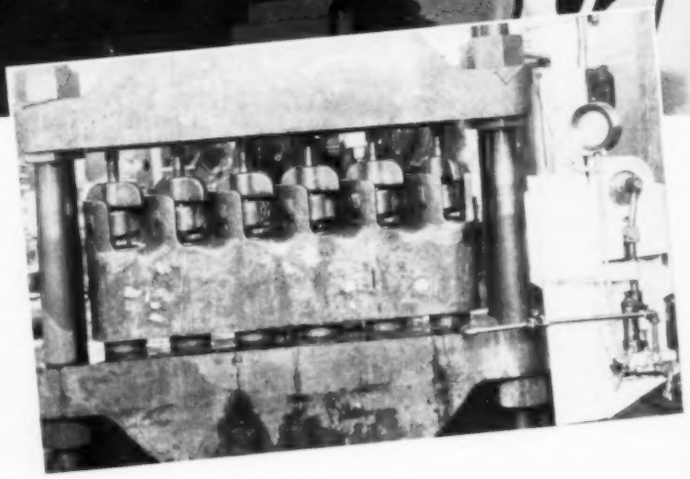


Fig. 3 (Left above)—Metallographic microscope and camera attachment for examining and photographing grain structure of steel. Fig. 4 (Above)—Hydrostatic test under high pressure to insure freedom from leaks

predetermined physical properties of collapsibility, flowability, fusability, permeability, hot and cold strengths and chemical composition.

Because choice of sand formula is dependent on the many factors involved in the making of each design of casting, it is necessary that very close supervision be employed in sand preparation. Some of the recent aids to the control of molding and core sands have been improvements in mechanical means of washing, drying and classifying sand, improved binders and new physical testing equipment for measuring the many properties of molding and core sands.

Making of molds and cores is in itself still an art but to its aid has come many new tools. Machines are designed to convey and ram the sand about the pattern with little effort and with far greater uniformity. The bumper, squeezer, roll-over draw and combinations of those together with the core blower, sand slinger, hand, pneumatic and various types of sand and mold lifting and conveying devices are all aiding in raising the art of molding and core making to a higher level.

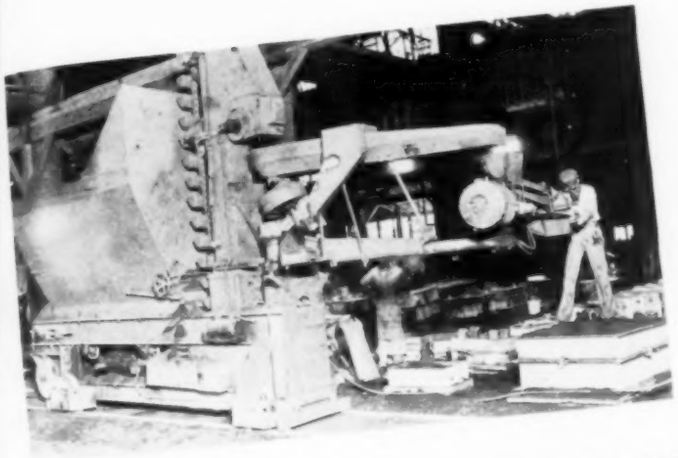
Present day melting units are excellent examples of the application of engineering. Here it is necessary to refine and superheat the steel to high temperatures. The need for metal free of gas and other impurities, and castable in an oftentimes damp sand mold, has made necessary the employment of science in many forms. Developments in this field have been many. With the advent of the electric powered furnaces, and its attendant high temperatures and speed, improvements in ceramics to withstand extreme heat and corrosive actions were found necessary.

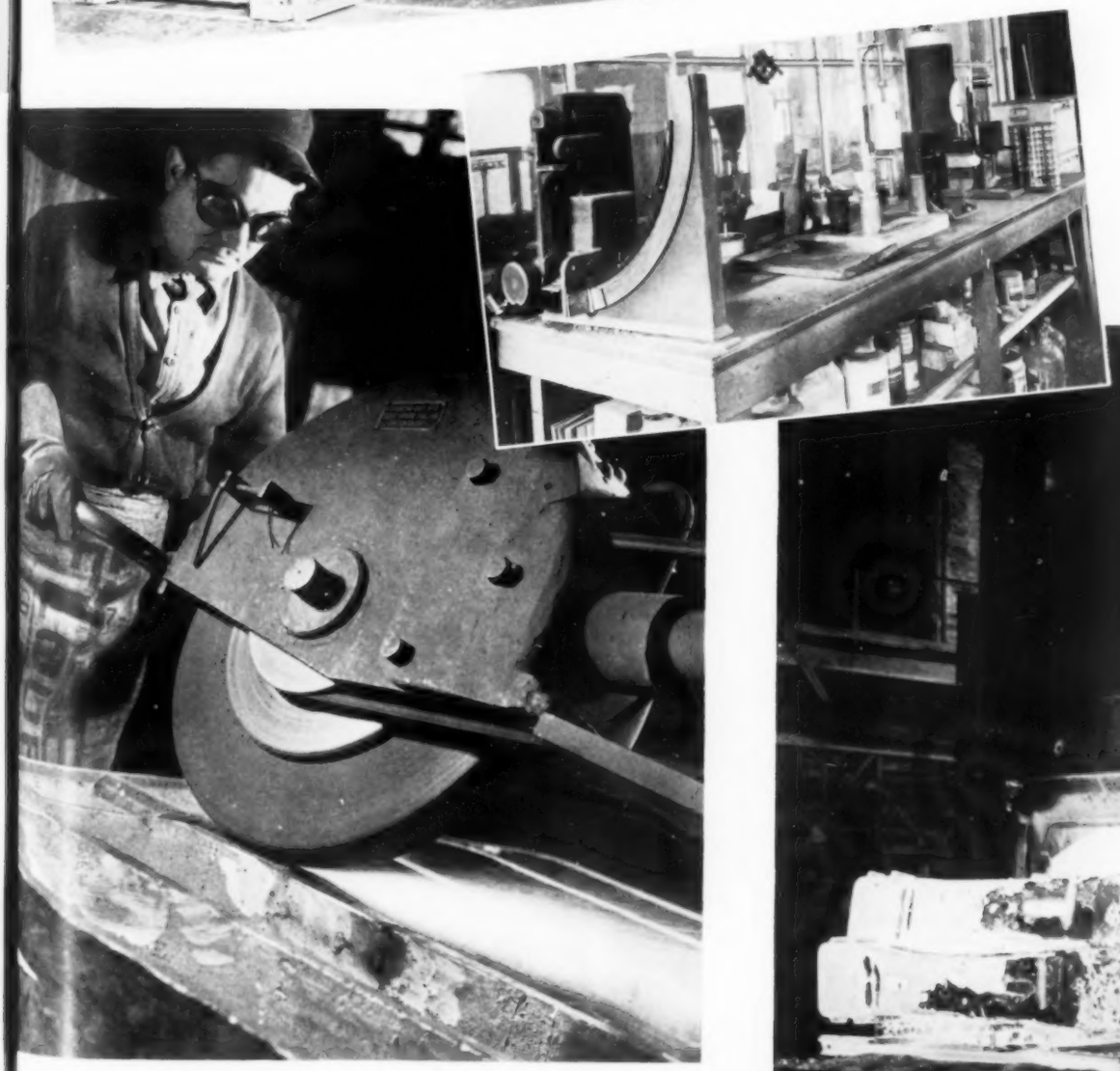
Superior acid and basic refractories were developed and are being used in the open hearth and converter as well as the electric furnaces. New devices for measuring temperatures and controlling flames and dampers of the open hearth are available. The chemistry of melting has been simplified greatly by the use of rapid methods of slag and metal analysis. The making of steel is rapidly becoming an exact reproducable process. The ease with which this one time art is being adapted by science is remarkable.

Co-ordination of the chemical and physical testing laboratories to furnish proper raw materials and to test at any stage of the process from melt down to tap results in a far superior product.

Clumsy attempts of only a few years ago to clean and finish the surface of the steel castings far are removed from present day methods. Few processes would portray more ideally the great strides made by the manufacturers of electrical and mechanical tools. Sand or metal blasting, faster and smother cutting abrasives for grinding, pneumatic tools for chipping, and improved welding technique through use of better rods and equipment are aiding in producing a surface more easily machined and pleasing to the eye.

No steel foundry today is complete without its heat treating department. It is in that department that character is given (*Please turn to page* 131)





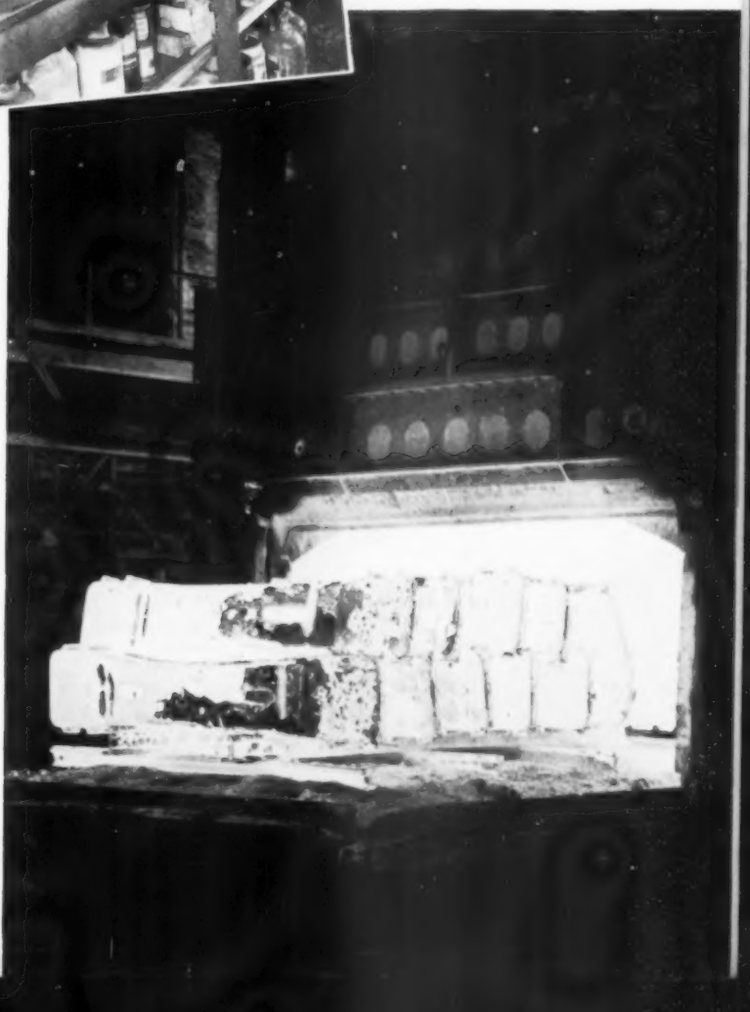
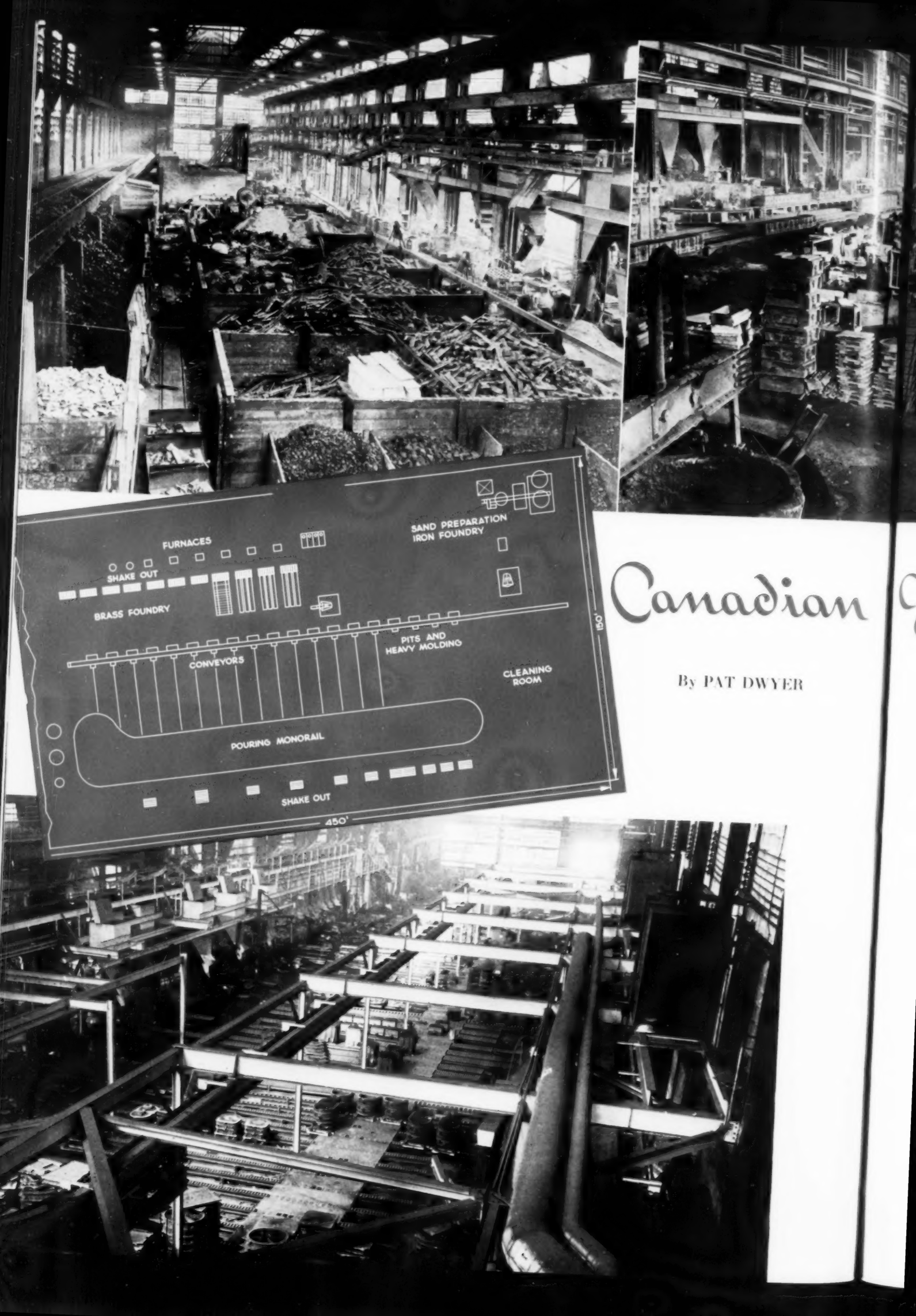


Fig. 5 (Left)—Sandslinger with other molding machines aid in raising art of molding and coremaking to a high level. Fig. 6 (Left below)—Snagging steel castings with swing-frame grinder to remove undesired projections left by gates and risers. Fig. 7 (Below)—Sand control equipment permits careful control of sand conditions to meet various requirements. Fig. 8 (Right below)—Sensitive temperature measuring and recording instruments insure uniform and accurate heat treatment



Canadian

By PAT DWYER

Foundry Operates Mechanized Shop

IMPERATIVE need for expansion of plant facilities several years ago resulted in the erection of a new plant, known as the West Plant, by the Canadian Westinghouse Co., on an extensive property in the western outskirts of Hamilton, Ont. The new plant has been extended from time to time to meet changing conditions brought about by greater demand for the company's products in long established lines, and by the adoption of a policy which embraced the manufacture of other pieces of domestic and public equipment.

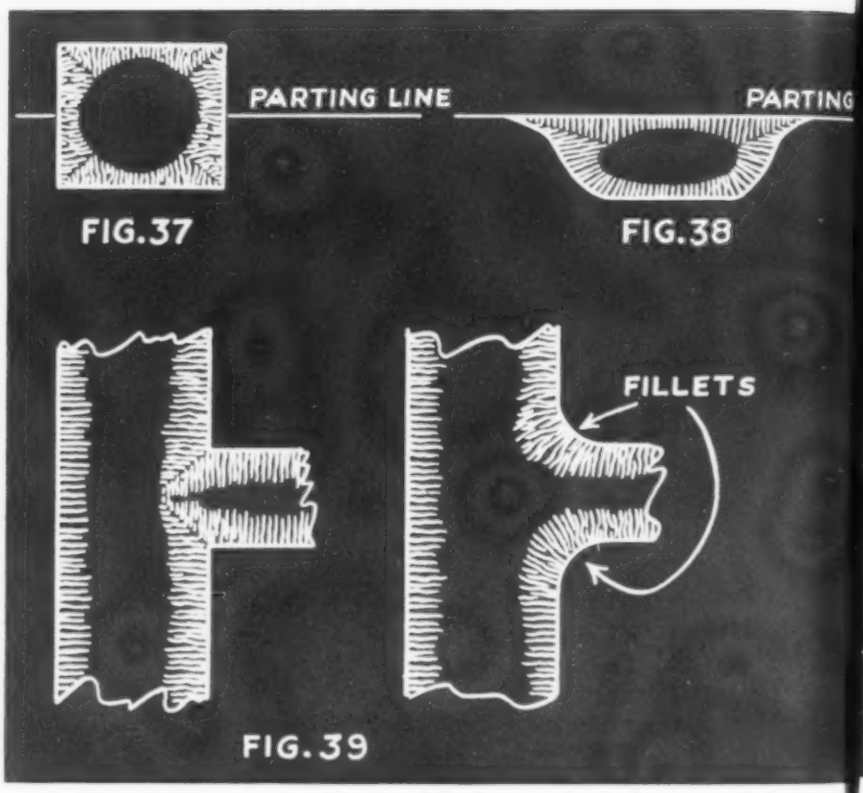
This field is so wide that the designers of the foundry were faced with a peculiar problem. The parent company in the United States operates a number of plants, with each plant devoted to the manufacture of a definite product, air brakes, refrigerators, household appliances, transformers, motors, etc. The Canadian plant operating in a more limited market produces all the items made in the single purpose plants, but not on such a mass production basis. To some extent also the foundry may be included in the jobbing foundry classification since castings are supplied to many outside interests.

While most of the castings are in the light and medium weight range, occasional orders are filled for castings within the heavy weight range. Two brackets recently completed weighed 32 tons each. Obviously the foregoing conditions presented many problems in crane service, mixing, melting and pouring of metal, pattern and flask equipment, floor layout, molding and coremaking equipment, sand preparation and distribution, etc.

The foundry, brick, steel and glass served adequately for many years. In common with practically all other found- (*Please turn to page* 135)

Upper Left—Raw materials are stored in concrete bins. Center Left—Outline sketch general floor layout. Lower Left—Present arrangement showing conveyors and monorail system. Center Above—Typical appearance of main bay under former conditions. Right Above—Roller conveyors terminate at shakeout stations. Right—Cupola may be charged from both sides

Gating Nonferrous Castings Is Important



IN PREVIOUS articles gating has been discussed more particularly with respect to the method of bringing the metal into the mold cavity in the right direction without agitation. Also attention has been directed to the necessity of avoiding the carrying into the mold cavity of any sand loosened by the impact of the pouring stream when it strikes the funnel entrance to the sprue as it is first poured into the mold. The detail of the size and shape of gate only has been suggested in passing in previous articles and yet the subject of the shape and size is a very vital one particularly as related to the different types of metals cast.

We have indicated the inadvisability of having restricted orifices at the entrance to the mold that would cause a squirting or spraying effect as the metal passed through these orifices to fill the mold cavity. We also have indicated the inadvisability of the use of square shapes as compared with the round shape of runners and gates. Round shape has the minimum radiating area and the square or rectangular shapes have corners that increase the radiating area at those points and consequently increase the speed at which these corners freeze resulting in restriction of the gate or riser area by reason of the frozen metal at these corners. Fig. 37 indicates the way the crystals tend to grow from the corners resulting in the restriction of the amount of area that is effective for the flow of metal through a square gate. That also is true of risers that are square or rectangular particularly where the metals have a tendency to form in large crystals which grow as temperature falls off.

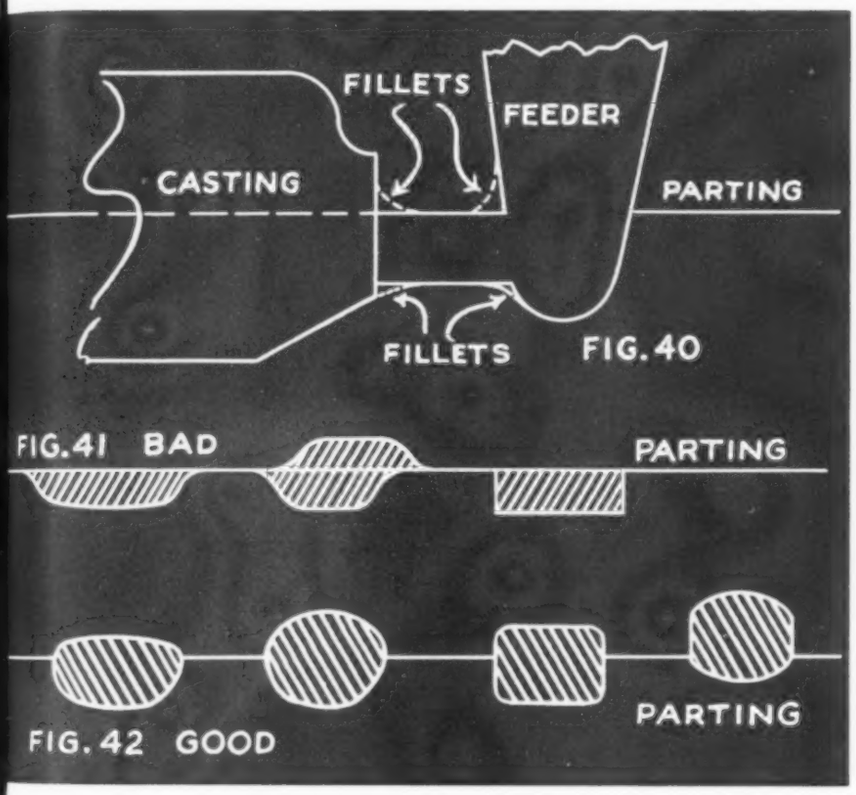
There are certain compositions such as the yellow brasses in which the presence of another element will change crystallization conditions so that one type of gating would be satisfactory without the element. Yet after the other element is added it is no longer necessary to use that type of gate in order to insure sound castings. For example in yellow brass without aluminum the gating must be such that pouring may be forced to fill the mold cavity as rapidly as pouring conditions will permit without any dangerous abrasion or destruction of

Figs. 37 and 38—Diagrammatic representation of the crystal arrangement during freezing of gate. Fig. 39—Crystal formation during freezing of a tee section with and without fillets. Fig. 40—Filleting of gate where it joins the casting and the feeder will eliminate trouble. Fig. 41—Gates of narrow or shallow cross section are bad practice in contrast to greater areas in good practice indicated in Fig. 42

the mold shape by reason of this force.

It is only the resistance to the possible destruction or harm to the mold cavity that governs the force permissible, thus establishing the size and shape of the gates. However, when yellow brass carries a relatively small percentage of aluminum the oxide film forms an envelope around the metal as it enters the mold and the need for forceful pouring no longer exists.

The result is that where the presence of aluminum is not objectionable the gating should be designed for the quiet entrance of the metal into the mold and the easy pouring that will insure that condition. If the application of the castings demands the absolute absence of aluminum to prevent leakage then the gating must be designed so that the mold may be filled with reasonable dispatch and sufficient force may be exerted in the pouring to avoid smoke spots and other defects which result from the lack of forceful pouring.



Consequently it may be seen that the shape and size of the gates used in the case of the alloy with the aluminum and the number of them may be different from those where the alloy does not carry aluminum. However, it is well to remember that the gate itself must be supplied with plenty of metal from the runner and from the sprue if conditions are to be in the fact as they are imagined to be in theory.

It frequently happens that a number of gates are provided for the entrance of the metal to the mold but the amount of the metal that can pass through the sprue or through the runner is not sufficient to completely fill all of these several gates at the same time. That results in spasmodic flowing of metal through one or more of several gates sometimes causing cold shuts. The latter being seen in the casting frequently leads the foundryman to conclude that the metal was poured too cold whereas a matter of fact the temperature was correct. Therefore, instead of a small sprue there should have been two or more sprues poured from a common basin or possibly one sprue a little larger would have been been sufficient.

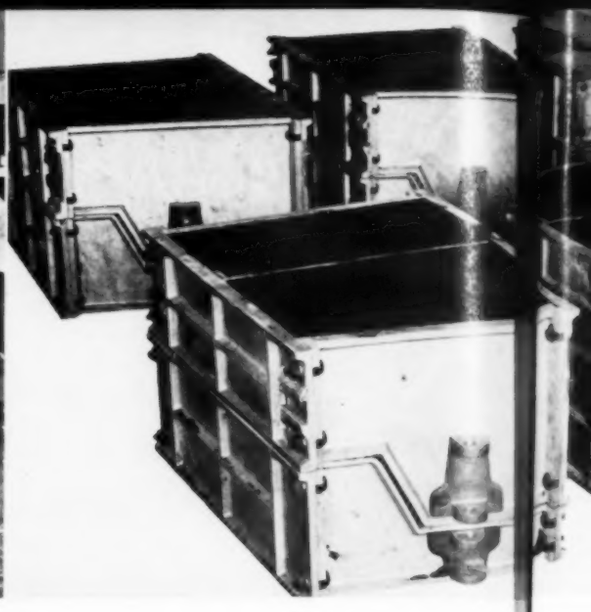
It is well to point out at this point that a large sprue frequently defeats the desired end by having the metal spiral down through its opening and suck in air with the metal which causes defects in the mold. A sprue of the correct size kept filled all the time during the pouring operation would have done a much better job and been more successful in supplying an adequate amount of metal to feed all of the gates simultaneously and insure the forceful pouring desired for that particular casting in that particular alloy.

By

Y. K. B. Patch

In the case of some other compositions commonly cast in the nonferrous foundry an important factor in the making of good castings in those compositions is the necessity of quiet entrance of metal. That is particularly true in the case of manganese bronze, aluminum bronze, silicon bronze and other similar compositions which are known as the high shrinkage compositions. The size and shape of gate cannot be laid down in an article such as this because it must vary with the size and weight and thickness of wall and other variables in the casting itself.

In general it should be the rule to have the gates big enough to (*Please turn to page* 128)



ARSENAL MAKES ORDNANCE C

BY PAT DWYER

THE building now utilized as a foundry at the Rock Island arsenal originally was erected for another purpose and for that reason the cut stone walls are much higher than the walls in any old time foundry. A casual glance would seem to indicate that the roof is considerably higher than on any modern foundry designed in accordance with the accumulated experience of many years in relation to sanitation, hygiene, light and ventilation.

At the time the building was erected the typical foundry was dark, low and squatty where the foundrymen carried on their more or less mysterious occupation in an atmosphere of gloom, dust and smoke. Jib cranes of the period necessarily were low in stature and anchored at the top to the roof beams. When the castings were shaken out a cloud of fine dust was carried aloft to settle on the beams in long triangular ridges.

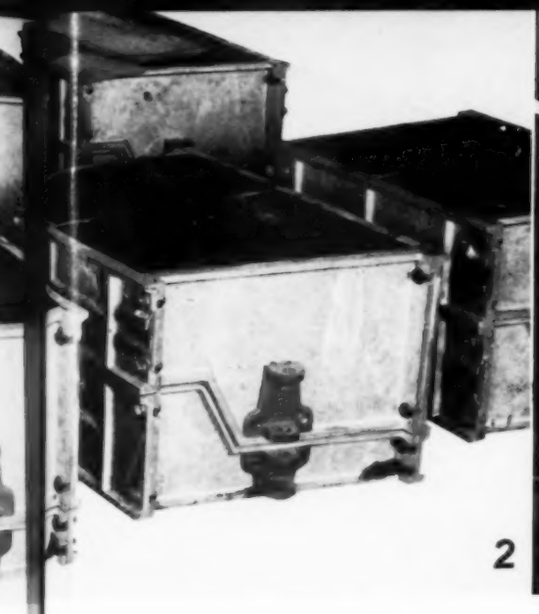
At a certain height the law of gravity or an explosion under a bottom board overcame the other forces which held the ridges in place and the outer layers slid off like so many miniature avalanches and fell to the floor or into the hair and onto the bare shoulders of men underneath. The dust in many instances was highly prized as a facing material by apprentices and others engaged in the surreptitious production of many small castings, iron stands, picture frames, emblems etc., ignored by the foreman and referred to cryptically under the general if somewhat misleading heading *government work*.

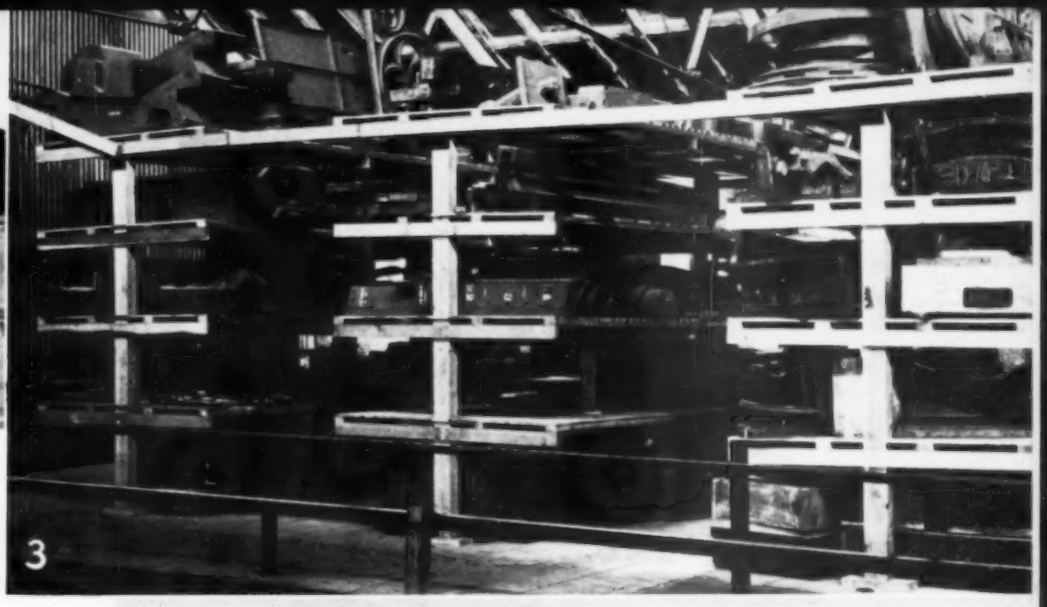
One or two jib cranes in the old arsenal shop long since were replaced by modern electric traveling cranes, one of 15 tons lifting capacity and the other of 10 tons made by the Whiting Corp., Harvey, Ill. Castings occasionally have been made in weights up to 10 tons, but these are regarded as exceptional. The majority are in the light or medium weight range up to 1 or 2 tons. Metal for the gray iron castings is melted in an electric furnace made by the Pittsburgh Electric Furnace Co., Pittsburgh, and in two cupolas supplied by the Whiting Corp., Harvey, Ill. The electric furnace has a normal melting capacity of 2000 pounds, but as in practically all electric furnaces, heats of 3000 and 4000 pounds are produced when occasion demands an over load of this kind.

Equipment Stands Overloading

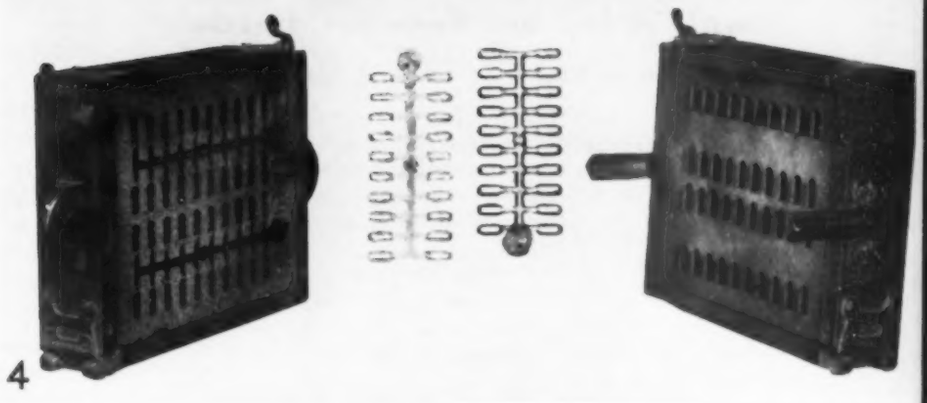
Perhaps it is pertinent to point out that this tendency to overload is almost universal among foundrymen. It is an open question whether the tendency reflects to a greater extent on the absolute faith of the foundrymen in the ability of the equipment to withstand these overloads, or a standing anticipation on the part of manufacturers and a consequent production of equipment capable of withstanding stresses and strains far in excess of normal or rated capacities. This is particularly true of cranes and furnaces.

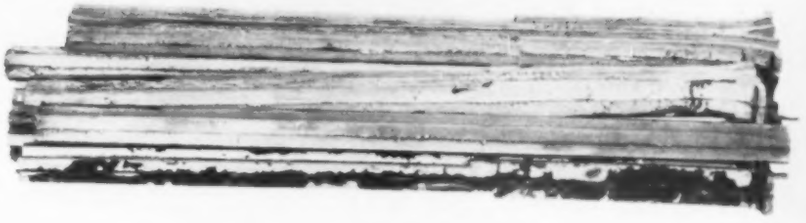
Probably every foundryman at one time or another has seen loads dangling or has hooked a crane on to a load far in excess of the lifting

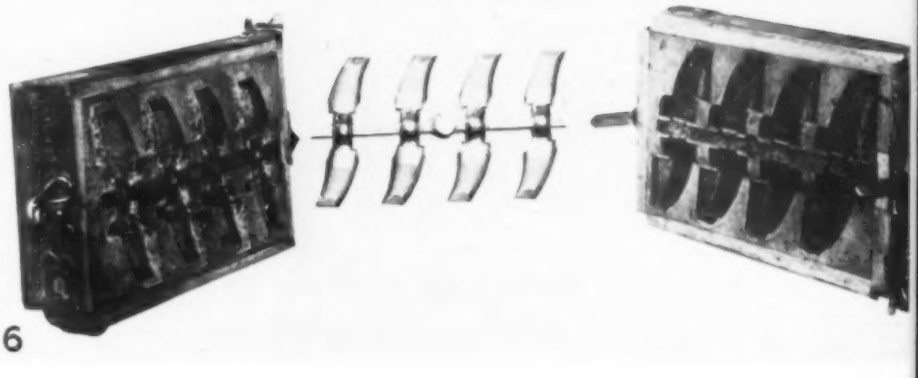




CASTINGS







capacity as plainly painted on the bridge. Rules governing weight of charges in melting furnaces are observed more in the breach than in the observance. A few years ago a cupola was bunged up and ceased melting after 2 or 3 hours in blast. In modern practice the time element is not a factor. Cupolas are operated 8, 16 or in some instances 24 or more hours continuously, or as long as the lining stands up. With the possible exception of the heavy heats melted in the electric furnace, no other piece of equipment in the arsenal foundry is pushed beyond normal capacity.

Although the employes are civilians, the operation of the foundry is under the jurisdiction of a regular army officer. In many respects, neatness, order, system and above all the production of castings that must conform absolutely to rigid specifications of appearance, chemical and physical properties, the foundry reflects the military atmosphere found in all establishments, arsenals, depots and navy yards operated by the three great arms of national defense, on land and sea and in the air.

The government is a generous provider of everything necessary in the way of personnel and equipment. The government also is a rigid and uncompromising cus- (*Please turn to page* 132)

Fig. 1—Nonferrous castings transported by wheel barrow to the cleaning room. Fig. 2—Typical cast iron flasks with sides and ends bolted. Fig. 3—Pattern storage building holds nearly 100 year's accumulation. Fig. 4—Links for rifle slings molded in snap flasks. Fig. 5—Long casting molded in matched dry sand cores. Fig. 6—Pistol butts. Inset (Far left) Superintendent Herman Alex

QUESTIONS and ANSWERS

Small Pits on Face of Casting Result from Molding Position

We are forwarding a bronze casting which contains small pits on the face. So far we have not been able to get away from that trouble, and would like to know how it may be accomplished. We use virgin metals, Albany 00 sand, and also flour on the mold surface.

Examination of the casting indicates that it is made well, and is sound as far as surface indications are concerned. It is not entirely clear how the casting is molded, but it looks as though you are making it face up in spite of the fact that you want that portion free from imperfections. Temptation to mold in that manner is obvious since the shape invites production of the casting in that position. However, for best results it should be molded with the face down. Make a dry sand core to form the irregular back, and then have a square block as a pattern which would provide the necessary core print.

The gate should be large enough to permit proper feeding, and the corner around the gate should be filletted to eliminate trouble from sharp edges and loose sand. Gate also should be attached to a shrink ball or riser. Have you fractured the casting through the heavy section to see if it is sound? The pits may indicate a lack of proper feeding, or presence of gas pockets. There is some indication on the sample that the edge of the gate has been eroded by passage of metal into the mold, and it is possible that some of the dislodged sand was carried into the mold and entangled in the surface of the casting.

Chill on Moldboard Face Will Depend on Several Factors

We shall appreciate your opinion on the proper thickness of the chill plate for a plow moldboard. We want to chill the face to a minimum depth so that the moldboard will scour in use but retain maximum strength.

As with a variety of apparently simple problems, a number of hitherto unconsidered factors appear when a solution is sought. In this particular instance effect of the chill on the face of the casting bears little or no relation to the thickness of the chill. For example a chill 6 inches thick would not impart a deeper chill than a chill plate 1-inch thick to iron of the same composition in a thin moldboard. At the other extreme a chill plate ¼-inch thick would impart a deeper chill to a low silicon iron, than a thick plate would impart to a high silicon iron. Unfortunately, a chill plate ¼-inch thick would crack, warp or break with the first or second casting.

Plow makers have discovered that a chill plate approximately 1-inch thick yields the best all round service. Variation in the depth of chill in the mold boards is secured by variation in the character of the cupola charge. As cast, the mold boards are hard and brittle. They are annealed to bring out the full strength and the ability to withstand the scouring action of the soil. Typical castings conform to the following approximate analysis: Silicon 1.00 per cent, manganese 0.60 per cent, sulphur under 0.06 per cent, phosphorus under 0.30 per cent, total carbon 3.50 per cent.

Silica Sand Addition to Cupola Daubing Will Improve Mixture

We will appreciate advice on proper daubing material for a small cupola. After the lining is chipped clean we daub it with a mixture of 1 shovel molding sand to 3 shovels of fire clay mixed to a thick mud.

Excessive burning away of the cupola lining may be due to the lining material, to the manner in which the cupola is operated, or to a combination of both causes. Certain highly refractory molding sands may be incorporated in the cupola daubing mixture, but this type of sand is not used in a small foundry. We are inclined to the opinion that your molding sand has a fine grain and a high clay content and therefore is not suitable for a daubing mixture. It lowers the melting or fusing point of the mixture and therefore is a detriment instead of a help. Replace this molding sand with the same amount of silica or sharp sand. This not only will increase the refractoriness of the mixture, but also will render it more permeable.

A possibility exists that the tight mixture you are using now cracks, swells and bulges and slides away from the brickwork when raised to a high temperature. Even where the lining material is satisfactory, it frequently is burned to an excessive extent, by blow-

ing a full blast when the cupola is almost empty near the end of the heat. If the blast pipe is not fitted with a gate, have one installed so that the volume of air may be reduced toward the close of the heat. The blast may be shut off altogether before the last tap. For a full understanding of the theory, operation and maintenance of the cupola you cannot do better than study "*Melting Iron in The Cupola*" by J. E. Hurst, published by the Penton Publishing Co., Cleveland.

Nonferrous Alloys Deep Etched Through Several Reagents

We are interested in the study of grain structure and internal shrinkage of brass, bronze and aluminum castings, and would like to know what materials are employed for deep etching those alloys.

Deep etching of brass and bronze can be accomplished by immersing in concentrated nitric acid, but if tin is present usually the attack of the acid is not uniform. Therefore, it is much better to add some hydrochloric acid which dissolves the tin. Consequently, the best results are obtained with a solution of nitric acid (1.42 specific gravity) to which a 10 per cent volume of hydrochloric acid (1.18 specific gravity) is added. Time of immersion is about eight minutes. Etched surfaces which have tarnished may be brightened by washing in chromic acid.

For aluminum and aluminum alloys either a 10 per cent solution of sodium hydroxide or a 5 per cent solution of hydrofluoric acid may be used. With sodium hydroxide the time of immersion may be from three to ten minutes while in the case of the hydrofluoric acid the time ranges from one to three minutes. With both solutions a dark coating will be left on the surface, but it can be removed easily by a momentary dip in chromic or nitric acid. While either may be used, it is claimed that better results are obtained by employing the chromic acid dip after immersion in sodium hydroxide, and the nitric acid dip after immersion in hydrofluoric acid.

Cupola Should Be Slagged To Secure Better Operation

We melt 5 tons of iron in 1½ hours in a 42-inch diameter cupola shell lined to 30 inches. The cupola is not slagged. We now require 6 tons per day, but the cupola chokes before that amount is melted. Would you advise increasing the inside diameter of the cupola by substituting a 4-inch lining for the present 6-inch lining? Would you advise melting 6 tons without removing the slag from the cupola?

For satisfactory operation, slag should be removed from any cupola after the blast has been on for about an hour. Up to that time the slowly accumulating volume of slag does not interfere to any great extent with the operation of the cupola. The exact time when it becomes imperative to remove the slag depends on several factors such as quality and quantity of coke, quality and quantity of limestone or other fluxing material, pressure and volume of blast, weight of iron charge and size of individual pieces. However, in many instances the slag hole is opened approximately 1 hour after the blast goes on. Many foundrymen prefer to leave the slag hole open all the time. The entire problem resolves itself into a consideration of a few simple factors: At least 10 per cent of the coke is ash. In the cupola this ash is reduced to a liquid state and with other impurities is known as slag.

This slag floats on top of the iron and is exposed to the blast. The iron is removed constantly or periodically, but in an unslagged cupola, the slag remains. Starting at the lining above the tuyeres, and under the chilling influence of the blast, the slag gradually solidifies and builds out toward the center thus reducing the effective melting area of the cupola. Continued for a sufficient length of time the bridge or diaphragm closes completely. In proper cupola operation that condition is prevented by adding a fluxing agent to the charge. The resulting liquid slag flows out through the slag hole and the cupola may be operated for any length of time. Your method of distributing the iron will determine whether you should increase the diameter of the cupola and pour off the heat in the usual pouring period without slagging the cupola, or leave the lining as it is, slag the cupola and take a little more time pouring the 6 tons. We think you will find the second alternative the more preferable of the two.

Sprues and Gates Used Weigh More Than Castings Made

We melt brass and bronze in coke fired crucible pit furnaces and the majority of our castings are thin, approximately 5/32-inch. Our metal loss seems to be too high. In any given heat the weight of the sprues and gates is greater than the weight of the castings.

Your inquiry is not quite clear as to whether you refer to the metal lost in the melting process, metal that never is recovered, or, to the metal loss represented by the amount of metal charged in the crucibles compared with the amount represented by saleable castings. Since you do not give any figures on the amount of metal charged and the amount in the crucible as lifted from the furnace, we cannot offer an opinion on that point. In good melting practice the average loss is approximately 2 per cent. If you refer to the discrepancy in weight between the gate metal and the castings, where the gate metal is not actually lost since it is recovered and remelted, we also are at a loss to offer a definite opinion.

On extremely light castings the weight of the gates and sprue may exceed the weight of the casting in any ratio from 1 to 10. Size of the sprue and gates cannot be reduced beyond a certain minimum to deliver properly metal to the casting or castings. However, in many instances the factor of safety prompts the foundryman or patternmaker to provide sprues and gates that are larger than necessary. An individual study should be made of each mold to determine the minimum size of passage that will function properly. This subject and many others in connection with nonferrous foundry practice are covered in a section of *Gates and Risers for Castings*, published by the Penton Publishing Co., Cleveland.

Need Core Vents on Large Casting

We shall appreciate your opinion on the proper mixture and analysis for a gray iron casting 21 inches wide, 30 inches high and 7 feet 2 inches in length. As shown on the accompanying blue print the casting is heavily reinforced on the inside by a longitudinal center rib and eight transverse ribs. The casting will be machined extensively and subjected to a hydraulic pressure test of 300 pounds per square inch and therefore must be clean and solid. Metal thickness in body and ribs is uniform, 1½ inches.

Since the casting is of practically uniform thickness throughout, practically any mixture that will result in a machinable gray iron will serve satisfactorily. Typical analysis will show: Total carbon 3.30 per cent, silicon 1.50 per cent, sulphur 0.10 per cent, phosphorus 0.50 to 0.60 per cent, and manganese 0.70 to 0.80 per cent. The mixture will contain from 10 to 20 per cent steel scrap. Improvement in the strength and density will be secured through the addition various alloying agents such as nickel, molybdenum, titanium, chromium etc. This analysis may be varied to a considerable extent without impairing the necessary qualities of the iron in the casting.

In this particular instance the cores introduce the hazardous and therefore, the most important factor. Owing to their position, almost entirely surrounded by molten metal, the amount of gas developed will reach maximum volume. Unless ample passage is provided for escape of this gas, a certain amount will enter the metal and either form visible blowholes, or affect the metal to such an extent that the structure is porous and consequently will fail when the pressure test is applied. As an additional precaution the core sand should contain a minimum amount of binder.

Hard Ball Castings Stick to Molds

We make hard iron grinding balls in water cooled iron molds, but have difficulty in removing the castings which stick to the walls of the mold. We shall appreciate information on how to prevent this trouble. Is it a common occurrence. What is the practice elsewhere. Are water cooled molds usually employed for making this class of castings.

Water cooled molds have been employed for making balls and other types of castings, but the method never has proved popular. Theoretically the method should prove satisfactory, but in actual practice the method usually is abandoned after trial. The main cause of abandonment is warpage of the molds or leakage of the water. In the present instance we are inclined to the opinion that the metal section in your molds is too thin. The walls become too hot and the molten metal sticks to the surface.

In American practice where hard iron balls are made in large volume, the permanent molds are pairs of heavy cast iron slabs mounted in a vertical position. One half is anchored solidly to the foundation or base, while the other half attached to a plunger actuated by hydraulic or pneumatic power, moves back and forth on slides. When the mold is opened the castings fall on to a conveyor belt or into trucks which convey the castings to the cleaning or shipping station. Success of this method is due in large measure to the mold mass which absorbs and diffuses the temperature. An interesting and unusually complete article on the production of grinding balls at a plant in Nevada appeared in the April 15, 1925 issue of THE FOUNDRY. Later in the same year an article was presented covering many interesting features on melting steel in the cupola for this class of castings.

To Learn Art Takes Time and Skill

We make ornamental bronze castings and are anxious to introduce the lost wax method of molding. We find that other foundries are getting much more satisfactory results through the use of special compositions instead of sand. Inquiries here and there seem to indicate that these compositions are regarded as trade secrets. We shall appreciate any information that will enable us to make some experimental tests, if you cannot direct us to commercial sources for these compounds.

Articles have been published on many occasions descriptive of the so-called *cire perdue* or lost wax process for making castings, but up to the present, so far as we are aware, no author writing in English has given the exact composition of the mold material. Even Benvenuto Cellini in his candid, entertaining and at times startling autobiography skips this feature in an otherwise fairly complete description of molding and casting the famous statue of Perseus. He states briefly that the mold and core were made from a mixture of plaster and brick dust. Whether this reference is due to a desire for secrecy or due to a lack of technical knowledge and possibly interest on the part of the translator, is an open question.

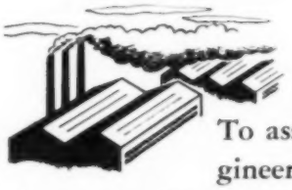
You are aware of course, that the lost wax process also is employed in some instances with sand molds. However, in this instance the wax in rolled sheets is applied to the inside of the sand impression of the figure and then the core is built inside. As with the plaster, the mold is raised to a high heat and the wax is melted out. We doubt the advisability of your investigating the subject. The method costs more than sand molding. Even if you were to read all the literature on the subject, a long period would elapse before you could develop the necessary skill and knowledge to turn out satisfactory castings. However, if you have sufficient orders in hand or in prospect to warrant a thorough investigation, we suggest you secure the services of a man skilled in that particular section of the foundry field.

Make Pattern with Shrink Rule

When we compare a casting with the pattern, the patternmaker claims we must use a shrink rule on the pattern and a standard rule on the casting. We claim we can use a standard rule on both. On a casting 12 inches high, the pattern is 12⅛ inches high on a standard rule, but in a soft mold the casting is 12¼ inches high. What we want to know is why should we use a shrink rule on the pattern and a standard rule on the casting when we try to find out if one matches the other. One man claims that if a pattern is 12⅛ inches high and the casting is 12¼ inches high, the casting has swelled ½ inch. Allowing for shrinkage the casting should measure 12 inches, but we claim it swelled only ⅛ inch.

For purpose of comparison a standard rule may be employed to measure pattern and casting. For that matter, the pattern and casting could be placed side by side. However, we fail to see any practical use of such a test. On account of the shrinkage factor the casting dimensions should not equal the dimensions of the pattern. There is no more sense in comparing the actual sizes of pattern and casting than there would be in comparing the dimensions of the casting with those on the drawing made on a scale of half or quarter size. Drawing and pattern are only means to an end.

The primary object is to produce a casting conforming to certain size and shape. The patternmaker uses a shrink rule and produces a pattern larger than the casting to anticipate the inevitable shrinkage. If the casting is as large or larger than the pattern the fault lies in the molding practice. The pattern leaves a cavity in the sand larger than the anticipated casting. If the mold strains or swells the cavity is increased in size. If your casting measures 12¼ inches high, then it is ¼-inch over size, ⅛-inch over the size of the pattern, and ⅛-inch for the normal shrinkage which was wiped out.



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MEN OF INDUSTRY

JOHN H. COLLIER has been elected president, Crane Co., Chicago, succeeding C. B. Nolte, who died recently. Mr. Collier joined the Crane Co. in 1903 as a core maker's helper and progressed through various positions. He was general manager, Bridgeport, Conn. plant from 1917 to 1929; president Cie Crane, Paris, France, and chairman, Crane Ltd., London, England, from 1929 to 1933, and vice president in charge of manufacturing from 1933 until his election to the presidency.

♦ ♦ ♦

BARNEY CASTOR, 1957 Fletcher avenue, South Pasadena, Calif., has been made a direct factory representative in California for the sale and service of mixers manufactured by the National Engineering Co., 549 West Washington boulevard, Chicago. Mr. Castor has been with the National Engineering Co. for the past 28 years and built the first Simpson mixer many years ago.

♦ ♦ ♦

C. P. RANDALL recently has been appointed service engineer, Eastern Clay Products Inc., Eifort, O. His territory will include the states of Pennsylvania, New Jersey, Delaware and Maryland. After attending Northeastern University, Boston, Mr. Randall went to work for Hunt-Spiller Mfg. Corp., Boston, where he did considerable work on sands in control, testing and research, and was in charge of the physical and chemical laboratory tests. More recently he was in charge of certain phases in the production of special metals. Mr. Randall completed a special foundry course at Wentworth Institute and has been associated with various sand committees of the American Foundrymen's Association. At the present time he is a member of the executive committee on molding sand research as well as being a member of several subcommittees.

♦ ♦ ♦

LOWELL M. GREENLAW recently has been elected vice president and general manager, Pullman Co., Chicago.

♦ ♦ ♦

J. LOUIS REYNOLDS, vice president in charge of export sales, Reynolds Metals Co., Richmond, Va., has been appointed general sales manager of the company for the duration of the present national emergency.

♦ ♦ ♦

JOHN D. SULLIVAN, chief chemist, Battelle Memorial Institute, Columbus, O., has been elected chairman, electrothermic division of the Electrothermic Society.

♦ ♦ ♦

AUSTIN W. CLARK recently was elected vice president, National Supply Co., Pittsburgh. Mr. Clark joined the National Supply Co. in 1940 as assistant vice president after having been associated for 4 years with Sears, Roebuck & Co., Chicago, as assistant comptroller. Prior to that he had been comptroller and treasurer for Hearst Publications, New York for 14 years and also was with Cerro de Pasco Copper Corp. in Peru, South America.

♦ ♦ ♦

EDWARD A. BACON, president, Smith Steel Foundry Co., Milwaukee, has been appointed a lieutenant commander in the United States Naval Reserve. His specific assignment has not yet been made, but it is expected to be in connection with ordnance or personnel work.

♦ ♦ ♦

W. D. MCMILLAN, works metallurgist, International Harvester Co., Chicago, has been elected chairman, Chicago Chapter of the American Society for Metals, to succeed ROY G. ROSHONG, chief metallurgist, Lindberg Steel Treating Co. Mr. McMillan served as vice chairman during the past year.

♦ ♦ ♦

SCHUYLER HERRES has been appointed research associate, Research Education division, Battelle Memorial Institute, Columbus, O. He is making an extensive review of technical literature on cupola design and operation, and will compile data and information on cupola melting practice for the Cupola Research committee of the American Foundrymen's Association. The literature survey by Mr. Herres is an initial step in a new cupola research program of the A.F.A., which is expected to remove most of the mysteries from cupola control and

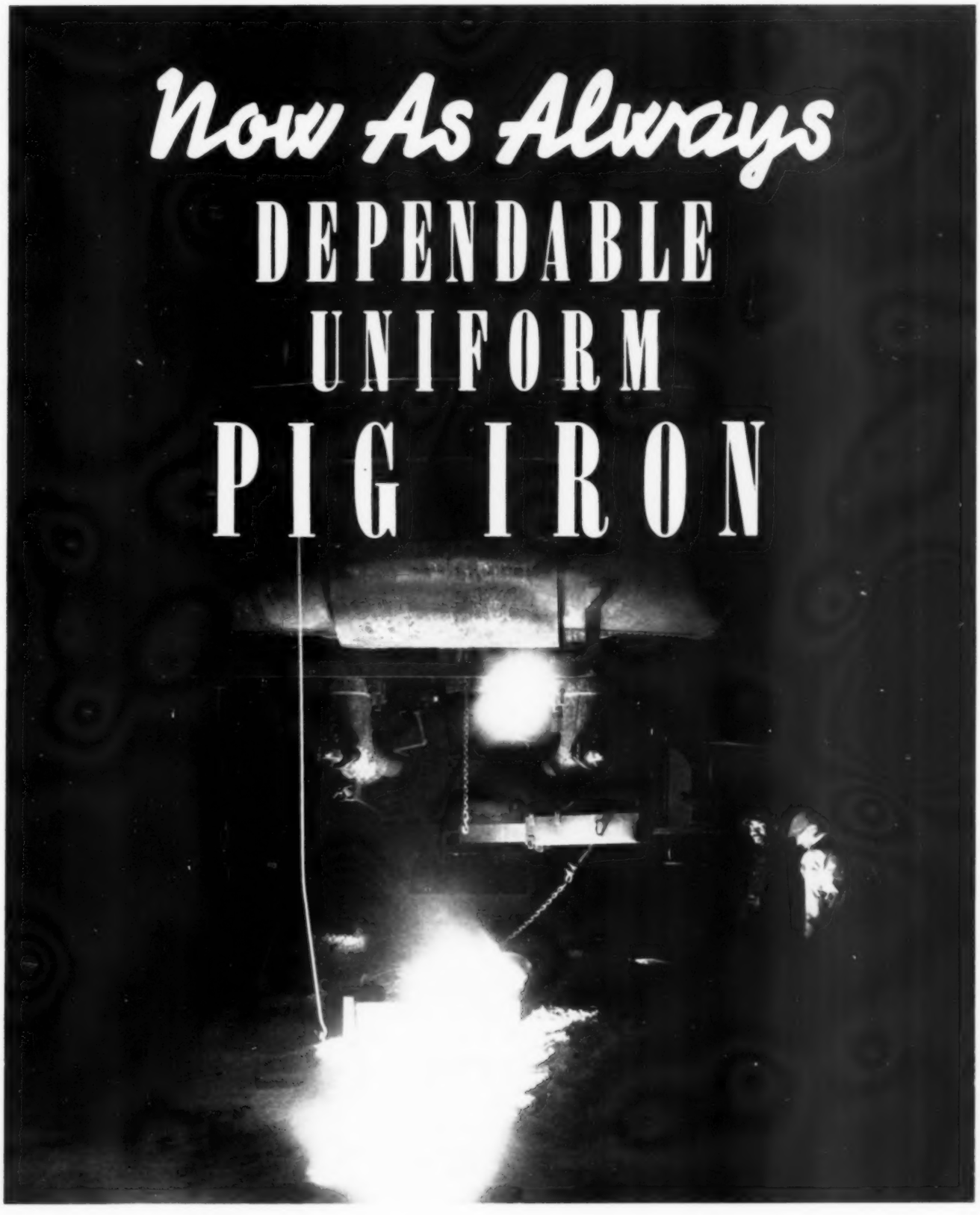
(Concluded on page 62)

C. P. Randall

John H. Collier

Barney Castor

Schuyler Herres



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(*Concluded from page* 60)

thus enable foundrymen to produce a consistently better quality casting at reduced cost. Previous to joining the Battelle staff, Mr. Herres was employed in the laboratories and foundry of the Mack Mfg. Corp., New Bruswick, N. J. He graduated from the Colorado School of Mines in 1939 and is a member of the American Foundrymen's Association.

• • •

FOWLER MCCORMICK, second vice president in charge of manufacturing operations, International Harvester Co., Chicago, has been elected president. SYDNEY G. MCALLISTER has been advanced from president to chairman of the executive committee, succeeding the late Addis E. McKinstry. MAURICE F. HOLAHAN continues as first vice president. Mr. McCormick is the son of Harold F. McCormick, chairman of the board of directors, and is the third generation of the family to head the farm implement company which was founded by his grandfather, the late Cyrus Hall McCormick. The new president joined the company in 1925 as a student employe in the Milwaukee factory. He served in the accounting and engineering departments, and then became successsively sales blockman at Omaha, branch manager at Grand Island, Neb., sales manager for the Northwest district, and assistant domestic sales manager. Mr. McCormick became an officer late in 1934 when he was named vice president in charge of foreign sales. In 1935 he was made second vice president and in 1936 was elected a director.

• • •

ARTHUR L. ARMANTROUT, since June, 1938, superintendent of industrial relations, South works, Carnegie-Illinois Steel Corp., has been transferred to the Lorain division, Johnstown, Pa., in the same capacity. Mr. Armantrout graduated from Purdue University in 1933 and joined the corporation in the physical laboratory at South works in November of that year, later becoming a test engineer, director of training and assistant superintendent of industrial relations.

Arthur L. Armantrout

• • •

GEORGE H. ZIRKER has been appointed superintendent and metallurgist, Taylor & Co. Inc., Brooklyn, N. Y., jobbing gray iron foundry. Mr. Zirker is a graduate of the Technical Academy, Zurich, Switzerland. In this country he has been associated with the Armour Research Foundation, Chicago, and the Carnegie-Illinois Steel Corp., Lorain division, Johnstown, Pa.

George H. Zirker

• • •

HAL W. FORSEY, controller, Enterprise Engine & Foundry Co., San Francisco, has resigned because of illness. E. F. ASHER, assistant controller, has been temporarily appointed to fill the vacancy created by Mr. Forsey's resignation.

• • •

J. A. MCCOY, 1436 Forty-first place, Des Moines, Iowa has been appointed representative in the entire state of Iowa for the Logan Engineering Co., Chicago. Mr. McCoy has been serving Iowa industries for more than 20 years.

• • •

REBECCA H. SMITH, has opened an office at 1920 Ford building, Detroit, for commercial microscopic work on metals. For the past 10 years she has been active in the foundry industry as metallurgist and technical writer, and for the past 5 years she has been doing research work with the microscope

• • •

ARNOLD B. KELLER, treasurer since 1932, and KARL O. SCHREIBER, assistant to the vice president in charge of manufacturing, International Harvester Co., Chicago, have been elected vice presidents. Mr. Keller will continue as treasurer. He joined the company in 1913 as a member of the treasury staff and has been a director since 1936. Mr. Schreiber will have supervision over the manufacturing, industrial relations, and industrial engineering departments. He joined the company in 1917 as general foreman of the assembly division of a motor truck plant then located in Akron, O., after five years previous experience with various automotive companies. In 1920 Mr. Schreiber was appointed assistant superintendent of the motor truck plant at Springfield, O., resigning two years later to become assistant to the president, Westcott Motor Car Co., Richmond, Ind. He returned to the Harvester company May 1, 1923, as assistant superintendent at Springfield and was made superintendent the following year. Mr. Schreiber was transferred to Chicago, June 1, 1936, as assistant works manager over the automotive group of Harvester plants, and on Nov. 1, 1940, was appointed works manager of the tractor plant group. On March 1, 1941 he was appointed assistant to the vice president.

• • •

L. J. FLETCHER has been appointed director of a newly created training and public relations department, Caterpillar Tractor Co., Peoria, Ill. W. H. FRANKLIN, formerly in charge of Peoria assignments, Price Waterhouse & Co., has joined the company as assistant controller.

• • •

FORREST G. SHARPE, formerly assistant to the sales manager, has been appointed Philadelphia sales engineer, Pangborn Corp., Hagerstown, Md., to fill the vacancy caused by the recent death of William T. Randall.

• • •

ROY F. KRUCK recently has been made general foreman, Keokuk Steel Casting Co., Keokuk, Iowa. Mr. Kruck formerly was connected with the Dayton Steel Foundry Co., Dayton, O., Pelton Steel Casting Co., Milwaukee. He served a special apprenticeship at the Gerlinger Steel Foundry Co., Milwaukee.

Roy F. Kruck

HOW TO soften A hard-boiled egg

H.B.E. is mighty important to you . . . and actually, you like him. But maybe you feel like addressing him in *extra* special affectionate terms when he gets on your neck, always wanting his castings yesterday. Or when it seems like you must go over your castings with a microscope to make sure no rejects come back to you. But here's how you can make life easier from *now* on, perhaps actually get a compliment out of him.

Convenient-size Bag Is Easy to Handle

Pin the coupon to your letterhead and mail it *right now*. We'll see that you get a sample of Truline* Binder—and facts about using it to get better castings and increased production in your core room.

That will show you how to make a H.B.E. crack a smile if *anything* can!

HOW TRULINE BINDER INCREASES PRODUCTION IN MANY FOUNDRIES

SAVES TIME ON BAKING Truline Binder bakes through quickly—increasing core oven output. Time saving is sometimes as much as 30%.

SAVES TIME ON CLEANING Cores collapse quickly; this makes cleaning faster. Some foundries have cut cleaning time 50% with Truline Binder.

SAVES TIME ON RAMMING Flowability of Truline Binder mix speeds ramming, particularly in green sand facings.

*Reg. U. S. Pat. Off., by Hercules Powder Co.

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Reg. U. S. Pat. Off.
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HERCULES POWDER COMPANY
Incorporated
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CHICAGO NEW YORK ST. LOUIS SALT LAKE CITY SAN FRANCISCO

HERCULES POWDER COMPANY
999 Market Street, Wilmington, Delaware

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Please send a free trial sample ☐

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JJ-39

C. E. Westover

C. E. Westover Is Made Executive Vice President Of A.F.A.

C. E. Hoyt

AT A MEETING of the board of directors of the American Foundrymen's Association held in New York on May 15, the staff officers of the association were appointed. C. E. Hoyt, executive vice president, treasurer and manager of exhibits, relinquished his duties as executive vice president and treasurer, and C. E. Westover, Burnside Steel Foundry Co., Chicago, was appointed to assume those duties. Mr. Hoyt retains his duties as exhibit and convention manager of the association.

In addition to those appointments, R. E. Kennedy was re-appointed secretary, N. F. Hindle, assistant secretary, E. O. Jones, director of safety and hygiene, and Jennie Reininga, assistant treasurer.

Mr. Westover the newly elected executive vice president and treasurer comes to the association well qualified to carry on and direct the work because of his knowledge of the industry and the association. A native of Lincoln, Nebr., he entered the foundry industry following graduation from the University of Nebraska, Lincoln, the industry in which his father had been engaged for many years.

At first he engaged in the manufacture of gray iron and nonferrous castings. Later he became associated with the Omaha Steel Works, Omaha, Nebr., in the steel foundry, and served in turn as works manager, Denver plant, American Manganese Steel division, American Brake Shoe & Foundry Co.; superintendent, Farrell-Cheek Steel Foundry Co., Sandusky, O., and finally as works manager, Burnside Steel Foundry Co., Chicago, from which position he resigned to accept his present duties. Mr. Westover has been active in the work of the American Foundrymen's Association, serving as a member of committees and in 1939 as chairman of the Chicago Chapter of that organization.

At the annual business meeting of the association held Wednesday morning, May 14, the following were elected officers:

For president to serve one year: H. S. Simpson, National Engineering Co., Chicago.

For vice president to serve one year: D. P. Forbes, Gunite Foundries Corp., Rockford, Ill.

For directors to serve for three years: Retiring President L. N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala.; R. J. Allen, Worthington Pump & Machinery Co., Harrison, N. J.; J. G. Coffman, Los Angeles Steel Casting Co., Los Angeles; W. J. Corbett, Atlas Steel Casting Co., Buffalo, and M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill.

To Hold Hearing On Foundry Wage

A recommendation for the establishment of a minimum wage of 40 cents an hour in the gray iron jobbing foundry industry wil be the subject of a hearing at 10:00 a.m., June 4 in room 3229 of the Department of Labor, according to General Philip B. Fleming, administrator of the Wage and Hour Division, U. S. Department of Labor.

Henry T. Hunt, principal hearings examiner for the division, will preside. Any interested person may appear by filing with the Division this information: his name and address; the name and address of the person or persons whom he is representing; whether he supports or opposes the recommendation; and the approximate length of time requested.

Corrosion Data

Underground behavior of various materials during exhaustive tests to determine their susceptibility to corrosion under service conditions is described in letter circular 646 just issued by the National Bureau of Standards, Department of Commerce.

Prepared by I. A. Denison of the Underground Corrosion Section of the bureau, the circular discusses the significant features of various materials from the standpoint of their resistance to corrosion in soils and in other environments in which the same corrosive factors are present.

Many lines of industry, including petroleum refining, railway transportation, chemical manufacture, etc., have been confronted with serious corrosion problems. By careful selection of alloys developed to resist corrosion under specific environmental conditions, the life of equipment in these and other industries has been prolonged considerably.

Since many of the materials have been shown to be resistant to sea and other natural waters, dilute acid and alkaline solutions, organic acids, sulphur compounds, reducing environments, or to other factors or conditions characteristic of corrosive soils, it is important to determine the suitability of these materials for service underground.

New Laboratories

Battelle Memorial Institute, Columbus, O., is installing 18 new laboratories and offices totaling nearly 10,000 square feet to take care of 40 additional research engineers. The majority of these laboratories are in the new laboratory building which was completed a year ago.

Poster Is Available

Walter Kidde & Co., Bloomfield, N. J., recently has made available a poster 11 x 16½ inches containing brief, concise instructions on how fire extinguishers should be used on each type of fire.

Pangborn Corp., Hagerstown, Md., has moved its Philadelphia office to 901 Beury building, 3701 North Broad street.

JEM-MIX

for

THE AMERICAN

MONOLITHIC

ONE PIECE

LINING

(No longer necessary to depend upon imported or fancy priced materials)

LINING OF ALL SIZES OF:

LADLES AND CUPOLA TROUGHS POURING FERROUS AND NONFERROUS METALS

Also in Slag Hole and Breast Hole

—150 NEW USERS—

We will gladly send you a list of the new users of this product, since it was announced. It reads like a Blue Book of the foundry industry.

JEM-MIX is odorless—easy to apply and has lower conductivity—Shipped in dry form—Simple to prepare—Just add water and mix in sand mixer or mortar box.

JEM-MIX can be shipped with any or all of our products in the same car. We manufacture a full line of refractories for the foundry industry including FIREBRICK of all kinds and shapes, FIRE CLAY, CUPOLA BLOCKS, HIGH TEMPERATURE CEMENTS, CASTABLES, Etc.

THE UNION MINING COMPANY

Main Offices:
OLIVER BLDG., PITTSBURGH, PA.

SINCE 1837

3 Plants
MT. SAVAGE, MARYLAND

THE ADVENTURES OF BILL

BY PAT DWYER **Drawings By RICHEY**

ONE night recently I asked Bill about his experiences during the A.F.A. convention in New York. This was the first opportunity I had to put him through the conversational wringer since his return. Beyond a quick glimpse now and again I had seen nothing of him in New York. On these occasions he either was hurrying to or from some rendezvous, or was anchored with a band of cronies in a hilarious do-you-remember-when session.

He admitted that in some respects the trip was all right and he had a lot of fun. In other respects it was not so hot. Somewhat to his surprise he learned that there is not a single gray iron foundry in New York, that is in New York proper, the island of Manhattan. Nonferrous foundries are operated here and there. The main offices of many important industrial companies are in the great financial center, but their foundries, from one to half a dozen are located far beyond the shadow cast by the Empire State building. Of course gray iron foundries still flourish in the general vicinity of the city, in Brooklyn and in New Jersey, but in the city itself, you might just as well look for a coal mine as a gray iron foundry.

Quite a contrast to the good old days when a hobo's experience was not complete until he had worked for a season in Cornell's or in other famous foundries of the city. What was considered even more important in the code of ethics rigidly observed by the floaters and drifters association, the experience conferred a certain amount of prestige somewhat similar to that acquired by old time crusaders who came back from the holy land with a cockle shell bound to the hat, or the loyal followers of Mahomet who come back from the holy city of Mecca with a piece of green ribbon.

The religious pilgrim motive was conspicuously absent from the New York adventure. In fact among those who had hopped into the wicked city and hopped out again, the principal topic of conversation was a list of places and a greater number of ways for breaking the Ten Commandments, the Golden Rule and statutes and bylaws provided by the city and state of New York, than can be found elsewhere on earth.

Members of this distinguished brotherhood did not wear a clam shell, a piece of green ribbon or a campaign button. They had no slogan, war cry, pass word, secret grip, gesture, whistle, grunt or any of the usual and orthodox signs by which one brother recognizes another in a total stranger. All one had to do either by accident or design, was to refer casually to the

He'll never go there any more

Bowery, Brooklyn Bridge, the Elevated, the Battery or Central Park. Instantly the party of the second part is reminded of a good one he heard one day in Joe's place. You know de place on Times Squay where they always had a live goat with his or her head sticking out through a hole in the door to announce the opening of the bock beer season in the Spring, et cetera and so forth to the extent of the listener's patience.

Diligent reading of Old Cap Collier, Old King Brady, Beadle's Dime, Half Dime and Log Cabin Library had accustomed me to the names of streets and public buildings where the heroes of these thrilling and delightful romances risked their lives night and day foiling the machinations of the underworld, the dirty dogs who lived in insanitary attics and cellars and spent most of their time guzzling prodigious quantities of spiritous and malt liquors while planning dirty work at the cross roads—any cross roads.

Even in my apprentice days far away from New York I had the privilege of hearing wandering birds of passage describe so many features of the great city that I had no feeling of surprise when I laid my own little peepers on them for the first time about the turn of the century. Occasional visits since that time have kept me in touch with the changing sky line, erection of great new buildings, digging tunnels through the island and under the rivers on both sides, and throwing bridges across bodies of water formerly considered impossible of spanning.

For the sake of peace and quiet after a rather hectic day, I rambled out on the George Washington bridge, one of the great bridges of the world erected high above the Hudson river, at this point nearly a mile wide. The river, a tidal estuary in which the tide rises and falls twice a day, lay quiet and peaceful, shining black with the banks outlined in rows of lights reflected in the sparkling water.

Ever since I can remember bridges have held for me a greater fascination than any other structure erected by the hand of man. I have admired them from a distance and I have examined them critically from touching distance. I have had the rare privilege on several occasions to follow the construction of a bridge from the day a power shovel removed the first load of soil from a pier foundation site, to the day the last rivet was driven, the last coat of paint applied and

(*Continued on page* 68)

From stock to dock!

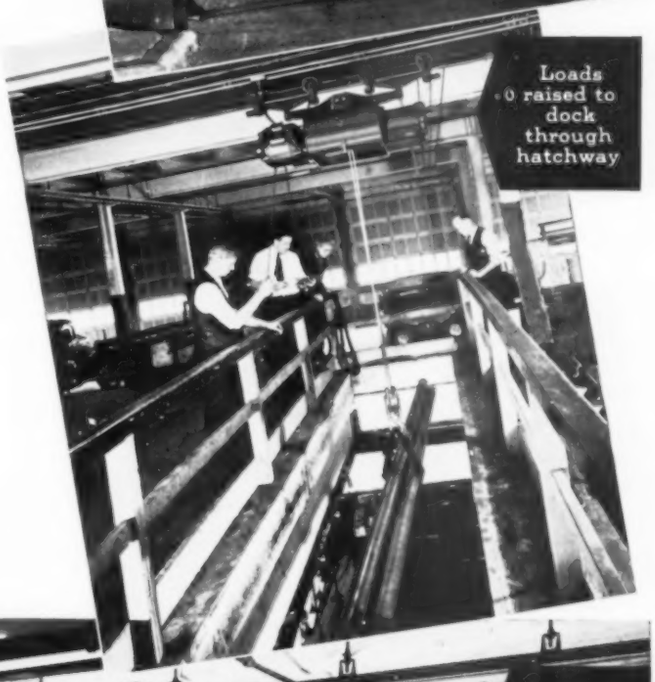
Overhead tracks allow access to stock

When it comes to bottlenecks these days our experience proves that the shipping department is the place that takes a real beating. Pictures here show how stock can move quickly from storage to trucks without congestion.

The extreme flexibility of American MonoRail equipment enables engineers to design such a system, related throughout the plant yet providing constant individual service at each process.

American MonoRail engineers, located in every industrial center, will gladly suggest from their wide experience a solution to your particular problem.

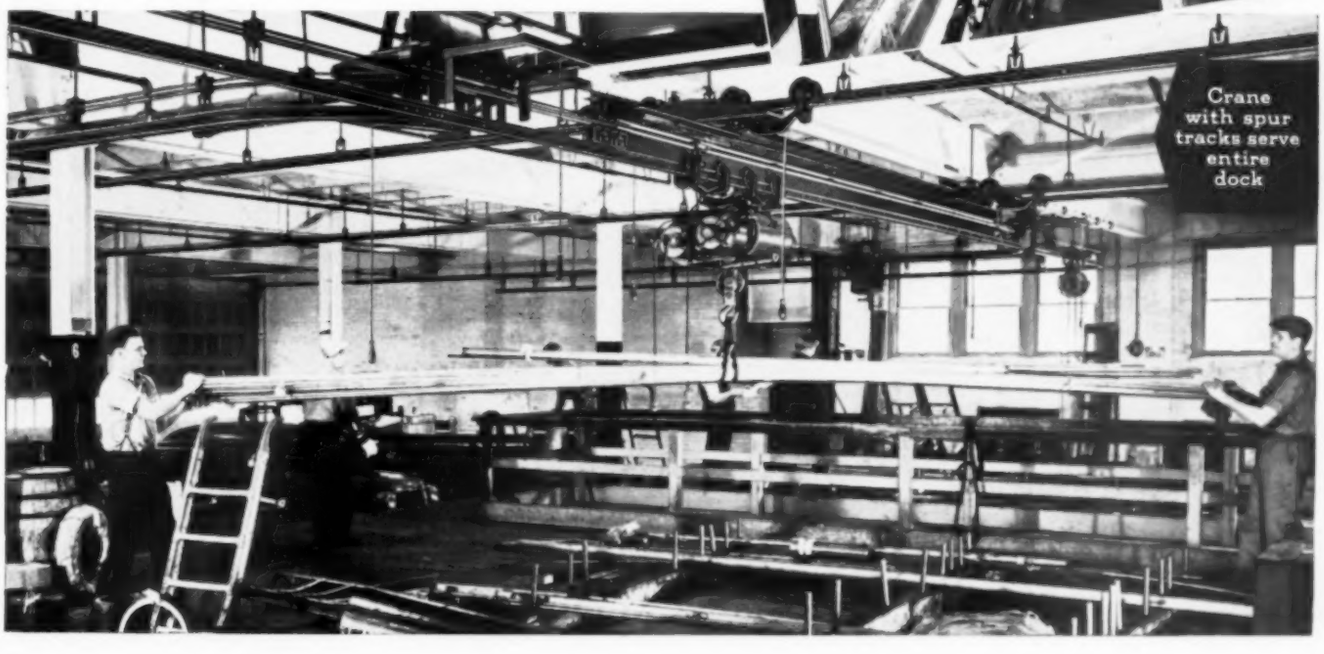
Write for copy of Blue Book illustrating hundreds of overhead monorail installations.



Loads raised to dock through hatchway

The American MonoRail Co.

13104 Athens Ave. Cleveland, Ohio



Crane with spur tracks serve entire dock

(*Continued from page* 66)

the mayor or governor cut the ribbon with a special pair of scissors and the crowd gave three cheers on general principles, and because every crowd likes to yell.

Standing there on the bridge utterly unconscious of the stream of automobile traffic racing in both directions, I was reminded of one of the late Col. Ingersoll's speeches in which he referred to visiting Napoleon's tomb in the Hotel des Invalides, Paris. The colonel, an inveterate foe of tyranny in any form, was not an admirer of the Little Corporal. I imagine he could go to town in great shape if he could come back long enough to say a few blistering words on a certain modern little corporal.

Ingersoll's condemnation of the greatest leader of the Four Horsemen, catalogued some of the high spots in his career. In a more peaceable mood I thought of some of the clever, ingenious and resourceful old time New York foundrymen and of some of the remarkable castings turned out by men without any mechanical equipment. They worked without an electric crane, traveling or stationary, conveyors or trucks, sand mixers or laboratories, volume or pressure gages on the cupolas. I never actually saw the castings, but a persistent legend in the foundry grapevine library credits Jim Floyd with casting columns 110 feet in length. I asked Bill if he ever had checked up on these figures. Off hand I should say the job presents some very pretty problems in gating, coring, venting, chaplets and shrinkage.

"Well," said Bill, "I'll tell you. The only person who could give you the inside dope on them there long columns is the bird who wrote the article on molding in Vol. 3, Encyclopedia Americana and published some 30 odd years ago. The entire description indicated that the writer never had been in a foundry and most certainly never had made a mold. Slight clues here and there readily apparent to any practical foundryman, showed that the expert probably had gone to the public library and read a few references illustrating the art and science of molding. He made a few hurried notes and then rested for a week. With no knowledge of the subject in the first place the notes were of little use and he just struck out at random like a few select alley cats playing leap frog by moon light. Listen now and also hold on to your seat. You never heard anything like this before, and I doubt very much that you will live long enough to hear the equal of it again."

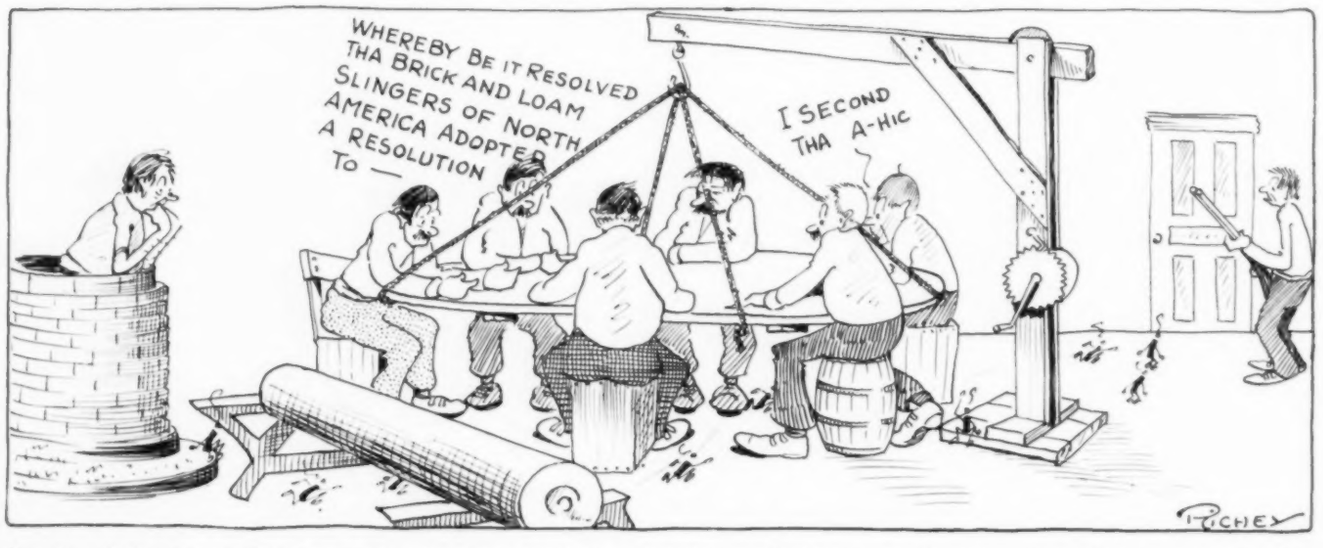
Loam casting is used for bulky, hollow articles, such as cylinders, large pipes, caldrons, boilers, etc. and is conducted in this manner: If, for instance a large cylinder is to be cast, a mold has first to be made as follows: To a beam in the roof of the foundry is affixed a perpendicular spindle with three or four holes through it to fix an iron arm in, at different heights by means of a nut. This arm has two bars placed at such a distance as to be capable of receiving a wooden plank which can be firmly secured to them by means of two clamps. The operation is then begun by laying an iron ring upon the ground and adjusting it so as to be concentric with the spindle. A cylinder of brick bats or clay and wet loam (instead of mortar) is then built upon it, some inches less in diameter than the intended cylinder, for which this is to form a core. . . The brick bats are then firmly bound together with iron hoops, annealed wire, etc., and a fire is lighted within the erection to dry it. When the loam used between the bricks is dry, a coating of loam is spread over the whole and is perfectly smoothed by causing the edge of the perpendicular board to revolve around it. This coat makes it of the proper size for the inside of the cylinder to be cast and is called the core of the mold.

Another cylinder is built, plastered and smoothed in the same way (except that no hoops are used) whose diameter is the same as the outside of the cylinder to be cast. When this is finished it is covered with a coating of charcoal, ground up with water like paint, laid on with a brush and a thin coating of loam is laid on. This is bound round with hoops and to these four hooks are fixed to lift it by. A thick coat of hair and loam is then laid over it. When all these are dry a man gets down into the cylinder and with a small pick pulls down all the bricks in the inside cylinder and then with a trowel cuts away all the loam, leaving the inside of the external cylinder (which is called the mold) quite smooth. This is effected by the coating of powdered charcoal which prevents the two coats of loam from adhering.

A deep pit is now dug in some convenient part of the foundry into which the core is let down by the crane. The core being placed in the pit, the mold is let down after it by the same means; and when they are adjusted, the sand is thrown in and rammed around about half the height. A flat cover of dried loam is then put on top of the mold and core and round pieces of wood are put in the holes which had before been made in the cover for pouring the metal in. The burying of the mold is then completed. When it is all leveled, the sticks which keep open the holes for the metal are carefully withdrawn and small channels made from the furnace to allow the melted iron to find its way to the mold.

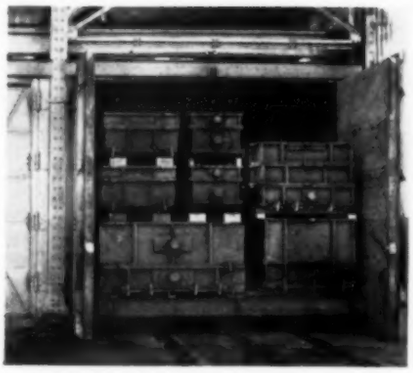
When the form is more complicated, as in pear like objects, etc.,

(*Concluded on page* 72)

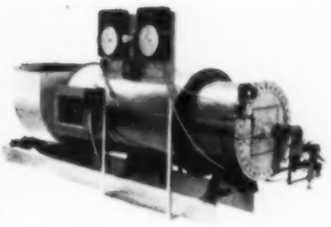


Knights of the Round Table unanimously adopt resolution that the good old foundry business ain't what she used to be

FOR DEFENSE WORK . . . .



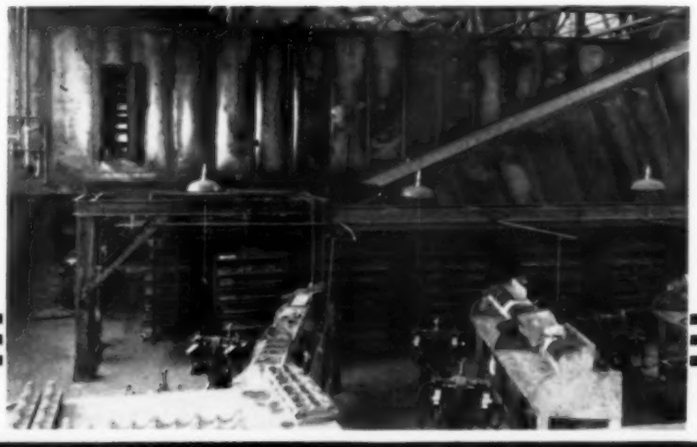
WHAT TYPE OVEN?



In no industry is the design and installation of the proper oven more important at the present time than in the foundry industry. The greater part of our capacity is given over to building ovens which are to be used either directly or indirectly in the development of our defense program.

A growing demand among foundries is for ovens for the exacting heat treating or "aging" of Magnesium Castings. Several such ovens have recently been ordered. First-hand knowledge of the requirements, and our experience of over thirty-five years, enables Young Brothers Engineers to consult and advise the proper oven design, with the correct heating method, and other necessary features.

Recent installations of Young Brothers Ovens range from drawer type ovens for the quick baking of smaller cores to those with a capacity to handle cars for heavy cores or molds. These ovens have been designed for a variety of heating methods such as coke, stoker-fired coal, oil, gas and electricity. Floor space has been saved in many instances by locating oil and gas heater units above the oven.



Whatever your production requirements, whatever fuel is most economical for you to use, Young Brothers Engineers are ready to serve you. There is one nearby. Call him!

DESIGNING
FABRICATING
INSTALLING

YOUNG BROTHERS COMPANY

35 YEARS EXPERIENCE BUILDING

Industrial Ovens

FOR ALL PURPOSES

6500 Mack Avenue • DETROIT, MICHIGAN

By A. H. ALLEN
Detroit Editor, The Foundry

AMONG DETROIT FOUNDRIES

FOUNDRYMEN in Detroit are not much worried over the auto industry's decision to suspend 1943 models in the interests of releasing manpower and machine power for defense purposes. While this will mean a paucity of die business along in January or February for automotive accounts, nevertheless the demands for machinery and equipment castings are building up so tremendously, with little sign of any relief, that it will be virtually impossible to supply any automotive dies.

The entire automotive industry has not announced suspension of the 1943 models, but General Motors, representing 40 per cent of the industry, has done so, and it is assumed the others will go along. GM estimates that the cancellation of models will save expenditure of $35,000,000 to $40,000,000, normally devoted to new model tooling, and will release 15,000,000 man-hours of production, 90 per cent of which can be diverted to defense purposes. On that basis, the entire industry will be able to release 37,500,000 man-hours of work customarily devoted to preparing and tooling for new models.

To Go Through Program

The industry will go through with planned introduction of 1942 models, and die work for them is just about cleaned up now, although some local foundries still are active on this phase. Originally slated for production the latter part of this month, the new program has been deferred another month to permit a last-minute extension of 1941 model assembly schedules. Now it appears the 1942 creations will start about Aug. 1, with announcements coming along about a month or six weeks later.

Assuming that dies used in 1942 model production will be carried over into 1943, which is also assuming it will still be possible to build a reasonable number of motor cars by that time, there will still be some foundry demand on this score. Dies will have to be duplicated because old ones have worn, and a number of minor changes which cannot help developing will call for new patterns and new castings.

Curtailment of motor car production by 20 per cent starting Aug. 1 is being worked out on the basis of 1941 model production totaling some 5,300,000 cars, which appears doubtful of actual attainment by the end of July. But whether it is or not, the limit for 1942 models seems to be a little better than 4,000,000 units.

Right now there is not much conviction among motor company officials that the industry can come anywhere near this goal. Three factors, other than arbitrary curtailment, make this plain. One is material shortages, another labor shortage, and the third sharply reduced demand resulting from overbuying of 1941 models, higher excise taxes and higher prices.

Already nickel, zinc and aluminum must be given the right of way into defense products, requiring the development of alternative materials for motor cars. All other metals, including iron and steel castings, have been placed under inventory controls.

From one-third to one-half of the labor forces in the motor industry are gradually being transferred into defense activities, the peak of this movement likely to come around Jan. 1.

Sale of new cars since last fall has been under tremendous artificial pressure, creating one of the greatest sellers' markets the industry ever has known. Car owners who normally would not come into the market for two or three years have been trading for new cars, fearful that this fall they would have to pay a penalty of 10 per cent higher price, a doubled excise tax, and might receive a car of inferior appearance and quality.

Makes Magnesium Castings

With one conveyor line on which molds are moved to the pouring station installed, and a couple of crucible melting furnaces in operation, the Ford magnesium foundry has been pouring castings at a rate of about 1000 pounds per week, for shipment to the Pratt & Whitney plant in the East. Several small castings, propeller hubs, rear crankcase sections and the like are being produced, to "get the feel" of operations before full production of 110,000 pounds a month is begun six or eight weeks hence when the new Ford aircraft engine plant swings into operation.

About 50 men are working in the foundry, against an eventual 350 and this group is the nucleus which is being trained in operations most thoroughly so they will be able to acquaint others as they are placed on jobs.

A special type of fire truck has been built for use in the magnesium foundry. On a Ford chassis a

(Concluded on page 72)

They Can't Stay Away Long

REMINISCING with the boys on the occasion of the Detroit Chapter A.F.A. meeting at Flint April 17, Jimmy Livingston recalled the days 20 years ago when he was jerking sodas in New York City for a living after he had ventured East from his job in Michigan. Things for Jimmy were pretty tight in those times, and his main recreation was an occasional stroll down Wall street and a jaunt through Battery Park. It was on one of these strolls that he stopped off at a newsstand and was amazed to see a copy of THE FOUNDRY thereon. Being an ex-foundryman, he bought a copy and retired to a nearby bench to scan the issue. One of the first items to meet his eye was an announcement of a new foundry being built in Flint by his friend Jack Barringer. When he saw this Jimmy forgot all about soda jerking and dashed off a letter requesting a job in the new plant. In a few days he received a reply, an offer of a job, and a new day dawned. Somehow managing to get back to Flint, he has been there ever since and is now service engineer with General Foundry & Mfg. Co. "Look, Mary, I got the job," as they say in the I.C.S. ads, "and I owe it all to THE FOUNDRY."

With reputations depending on performance, Diesel engine builders take no chances in selecting materials. Hence the widespread use of Molybdenum irons for such vital parts as cylinder heads, liners and pistons where heat resistance, as well as strength and wearing quality, is demanded.

Molybdenum in combination with chromium makes gray iron highly resistant to growth and cracking, gives good wear resistance and strength—all at comparatively low cost.

Write for our free technical book "Molybdenum in Cast Iron" for detailed, helpful data.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS. MOLYBDIC OXIDE BRIQUETTES FOR THE CUPOLA—FERROMOLYBDENUM FOR THE LADLE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

(*Concluded from page* 70)

unique type of body has been erected, comprising chiefly a large steel hopper which is filled with sand. An air compressor forces sand and compressed air into hose lines to permit spraying sand on magnesium fires, the only effective way to extinguish them. Water only stimulates burning magnesium, while carbon dioxide systems seem to have little effect.

Speaking of magnesium, when a visiting engineer recently inquired of one local foundryman what he did when the metal "let go," the latter said, "Turn the other way and run like hell."

Possibility is seen of alloy iron dies being used for aircraft stamping work which will assume important proportions in this district shortly as a result of the auto industry's activity in construction of heavy bombers. Already the industry—at least the "big three" — is committed to supplying parts and subassemblies for 300 bombers a month just as soon as production can be started. And it appears likely this production schedule will be doubled. General Motors will furnish North American bomber subassemblies through its Fisher Body division which is now equipping a plant at Memphis, Tenn., for the work with other Fisher divisions contributing. Chrysler has leased space in the Graham plant here and will supply subassemblies for the Martin bomber.

Production Rate Tripled

Ford is now building a large new plant at Ypsilanti, Mich., to produce parts for the Consolidated bomber. Within the past couple of weeks, Ford has announced production rate of 270 units a month, nearly triple the originally assigned 100. The plan now is to ship subassemblies for 100 of these ships to Fort Worth and Tulsa, where new bomber assembly plants are being erected, and complete the other 170 at Ypsilanti. Both GM and Chrysler at present plan to ship wing sections, center sections, tail assemblies and the like to new bomber assembly plants in the southwest.

Aluminum alloy stampings of the type used in these bombers until now have been produced largely with dies of Kirksite or some similar low melting point alloy. The small stamping runs involved do not justify the use of alloy iron dies, since the latter require much painstaking work in finishing. However, with designs fairly standardized and longer runs in prospect, a change to iron dies appears likely in the interests of greater speed and accuracy in forming large aluminum stampings.

A local jobbing foundry, normally supplying a large volume of automotive work, currently is supplying about 50 per cent of its production for defense manufacturing in one form or another, principally castings for machine tool frames, bases, beds, ways, etc. The proportion is likely to increase further.

Users of silvery iron are being asked to detail minimum requirements over the months ahead as outlook for supplies of this material becomes increasingly clouded.

Commenting on the general materials situation, one local foundryman observes, "If the government is successful in controlling prices of raw materials in this inflationary period, more power to them. In the last war we cheerfully paid $54 a ton for pig iron, and thought little of it. Today we are paying $24."

Adventures of Bill

(*Concluded from page* 68)

where a man cannot be introduced to pick out the bricks, the mold must be sawn in two perpendicularly with a fine saw to get it off. It is then put together again round the core and the crack plastered up with loam.

"There y'are," said Bill, "the whole blinkin' kettle of fish in a nutshell. 'To a beam in the roof of the foundry is affixed a perpendicular spindle with three or four holes in it to fix an iron arm in, at different heights by means of a nut.' Nothing could be simpler than that. To the beam of the roof is affixed a spindle. I like that word affixed. It is so clear and illuminating. Gives one an exact impression of how the spindle is held in place. Nothing is said about a seat for the lower end of the spindle. Perhaps it floats free and wabbles about like the tail on a kite. Maybe it is held in a vise or by a magnet.

"After building the core in a somewhat extraordinary manner, a manner that would have earned for him a discharge ticket and a caustic comment 'For the luvagod, who told you, you were a molder?' in any foundry in the country, our hero proceeds with the outside. Apparently at this point he picks up the notes covering the chapter in Cellini's memoirs, where that famous artist describes the molding and casting of the statue of Perseus.

"The encyclopedia lad has a spindle and sweep. He has swept up the core, but it never occurs to him that the outside of the mold is built in approximately the same manner, by building a circular brick wall, lining it with loam and sweeping it to shape. Not at all. He builds a false core the diameter of the outside of the mold, paints the surface with charcoal and water and then daubs the outside with a thick coating of loam and hair. When it is dry a man goes down the inside and removes the false core.

"The final payoff comes in the last paragraph: 'Where a man cannot be introduced to pick out the bricks, the mold must be sawn in two perpendicularly with a fine saw to get it off. It is then put together again around the core and the crack plastered up with loam.'"

"Well," I said, "what are you going to do about it?"

"The last day of the convention," here he tapped me familiarly on the upper vest button, "I called an emergency meeting of Lodge No. 13, Retired Brick & Loam Slingers of North America and adopted a resolution to present one copy of this treatise on loam molding to each chapter of the association. Suitably mounted in a frame on the chairman's desk it will serve as a source of information and inspiration to the younger members on how to write technical articles and build up a reputation on nothing."

Operating in pits behind the core-ovens in two plants of the Lynchburg Foundry Co. in Lynchburg and Radford, Va., 20 stokers made by the Iron Fireman Mfg. Co., Portland, Ore., are claimed to have slashed fuel costs 67 per cent. When the ovens were hand-fired it cost $3.25 for fuel per ton of metal cast. With stokers the fuel cost per ton cast is $1.08. Added to fuel savings is the elimination of core losses through burning and a reduction in labor

Activities of FOUNDRY GROUPS

Quad-City

CORE binders was the subject of discussion at the April 21 meeting of the Quad-City Chapter held at the Fort Armstrong Hotel, Rock Island, Ill. Approximately 75 were present and Nathan Lesser, Deere & Co., Moline, Ill., and chairman of the chapter presided. Mr. Lesser introduced J. A. Gitzen, Delta Oil Products Co., Milwaukee, whose topic was "Core Binders, Their Characteristics in Various Core Sands and Core Sand Mixes."

Mr. Gitzen told of the various types of core binders used in the foundry industry, their properties, characteristics, and uses in making large and small cores. Advantages and problems involved in the use of cereal and pitch binders, and linseed, fish and soy bean oils were given consideration. Many features of the binders were pointed out which had been determined by considerable research work that had been done to reduce troubles caused by cores in making castings. Core washes also were discussed. The talk proved of real interest; and many questions were asked with clear answers given to all.

Report of the nominating committee was made by Hyman Bornstein, chairman. Nominations are as follows: A. H. Putnam, A. H. Putnam Co., chairman; A. D. Matheson, French & Hecht Inc., vice chairman; J. Morgan Johnson, Moline, Ill., secretary-treasurer. Members nominated to serve on the board for 3 years are: Harry Mead, John Deere Harvester Co., W. E. Jones, Bettendorf Co., and R. E. Wilke, Deere & Co. Nathan Lesser was nominated to the board of trustees for 3 years. Ray Wendland was appointed chairman of the committee to arrange for the annual chapter outing.—*J. Morgan Johnson, secretary-treasurer.*

New Jersey

AT ONE of the most largely attended meetings of the year, April 28, at the Downtown Club, Newark, N. J., members of the New Jersey Foundrymen's Association heard Glen Gardiner, New Jersey district director, Training Within Industry Division, OPM, discuss the sharply increased demand for trained labor in all vital defense industries. He claimed that the most pressing need is for development of men in the shortest possible time for some one production operation. With a considerable shortage of men with all around training he suggested that foundries engaged in a training program should continue, but it is of prime importance that they arrange to train men for specific jobs, something that can be accomplished in relatively short time. Mr. Gardiner, well known in the field of industrial training is an executive of the Forsman Woolen Co., and formerly was engaged in the foundry industry for a period of several years.

Outlining the training program, he said the OPM had divided the country into 22 defense districts. In the New Jersey district the program is administered by a director, an assistant director and an advisory committee of four members, two representing management and two representing labor. An additional panel of 21 consultants is available from the most experienced New Jersey training supervisors and now loaned to the OPM on a part time basis. The speaker was quite confident that the division was in excellent position to assist foundrymen in their training program.

He cited figures to show the heavy demands the defense program is making on industrial manpower. The lease-lend schedule would involve approximately 17 billion man hours and apart from that, the defense work would require almost the same amount. In 1938 the aircraft industry employed 28,000 men. This number had risen to 49,000 in 1939 and to 140,000 in 1940. At present the number is 300,000, with a probable increase to 455,000 in 1941 and 847,000 in 1942. In ordnance production

Four newly elected officers of the Central Indiana chapter, left to right: R. A. Thompson, Electric Steel Castings Co., Indianapolis secretary; B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis, vice chairman; H. B. Harvey, president, Indiana Foundry Corp., Muncie, Ind., chairman and J. P. Lentz, International Harvester Co., Indianapolis, treasurer. Central Photo Service

ADVERTISING PAGES REMOVED

The picture at the dinner of the Central Indiana chapter, left to right: Stowel C. Wasson, National Malleable & Steel Casting Co., Indianapolis; B. P. Mulcahy, Citizens Gas Coke Utility Co., Indianapolis; Herbert S. Simpson, vice president of the A.F.A., and president, National Engineering Co., Chicago; R. E. Lee, chairman of the A.F.A. cost committee, and comptroller, Grede Foundries Inc., Wauwatosa, Wis.; I. R. Wagner, chairman of the Central Indiana chapter; C. E. Hoyt, executive vice president of the A.F.A.; E. O. Jones, in charge of membership of the A.F.A.; H. B. Harvey, Indiana Foundry Corp., Muncie, Ind., and chairman-elect of the Central Indiana chapter. Central Photo Service, Indianapolis

the number of men has increased 14,000 per cent over the average for the past 10 years. In view of this universal and terrific expansion no shop is too small to escape the effects. Before the end of the year he anticipated a great expansion in the number of women employed in industry, to meet increased demand and to replace men drafted into military service.

The training problem is three fold: Speedy development of new employes; upgrading of men with some experience; and training of supervisors. At this time, the speaker claimed the training of an adequate supply of foremen presents a very serious problem.

President John C. Phelan, Benjamin Eastwood Co., Paterson, N. J., appointed a nominating committee of four members to select a slate of officers for the coming year. —*Ben Price.*

New England

AT THE regular monthly meeting of the New England Foundrymen's Association, held at the Engineer's Club, Boston, April 9, John N. Ludwig Jr., metallurgist, Electro Metallurgical Co., New York, was the speaker. Mr. Ludwig, who has been active during the past 20 years in iron and steel production, is at present devoting considerable time and study to application of ferroalloys to metallurgical problems. He has obtained much valuable experience and knowledge through the many years devoted to study of operating practices and problems in a variety of manufacturing plants.

His talk, "Metallurgical Properties of Cast Iron Controlled by Ferroalloys," stressed the importance of not only the quantity, but also the type of carbon present in cast iron, and showed how ferroalloys are used with good success to control the properties of cast iron through their effect upon the carbon. Mr. Ludwig recommended frequent chill tests during the heat to bring about better control. Where it is necessary to get high total carbons, from 3.50 to 3.70 per cent, best results are obtained by using a base of low silicon pig iron. Irons of lower total carbon are used in general where good density and pressure resisting properties are demanded.

When higher silicon pig base irons are used, the tendency is to push the total carbon content down. Insulated coke is used to help keep the total carbon down in the cupola. In regard to the addition of alloys, the speaker discussed the beneficial value of late additions. Speaking also of the best silicon content to use in ferrosilicon, he said that the 50 per cent alloy normally was easier and cheaper while the higher percentages such as 95 per cent often times gave maximum benefits. He covered cupola additions by means of either lump alloys or ferro alloys or ferroalloy briquets, and ladle treatments with ferrosilicon and the new improved SMZ and CMSZ type of alloys. Many instructive slides were shown and an interesting discussion followed the talk.—*M. A. Hosmer.*

Reading

REGULAR meeting of the Reading Foundrymen's Association was held at the Berkshire Hotel, April 15. Eighty members were present.

The speaker of the evening was L. P. Robinson, director of core oil sales, Werner G. Smith Co., Cleveland, and his subject was, "Variables in the Coreroom—Their Treatment and Cure."

Mr. Robinson was one of the most interesting speakers the association has had in many a day. His description of conditions as he found them in the core rooms of various foundries he has visited during the 25 years he has been in the core oil business, was presented forcefully. The humor which the speaker injected into his talk, as well as the practical angle from which he approached his subject, greatly impressed the many foundrymen present. The talk will go down in the history of the Reading Association as one of the most interesting that it has had.

Prior to the meeting, Dr. Bisbing,

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director of the Berks County Tuberculosis Sanitarium, addressed the foundrymen present on industrial and occupational disease hazards and what to do about them.

A short meeting of the entertainment committee was held and preliminary plans were made for the fourth annual picnic and golf tournament, to be held at the Manor Golf Club, June 28.—*H. C. Cummings, secretary.*

Central New York

REGULAR meeting of the Central New York Chapter was held at the Onondaga hotel, Syracuse, N. Y. Attendance at meetings has declined due entirely to the increased industrial activity. Approximately 60 members were present to hear H. S. Washburn, past president of the A.F.A., and president, Plainville Casting Co., Plainville, Conn., and Joseph Nixon, Whitehead Metal Products Co., New York.

Immediately following dinner, Mr. Washburn discussed in detail the program for the national convention in New York. He stated that, while the foundrymen of the nation were exceedingly busy at this time, every indication pointed to a good attendance at the convention and that the Eastern chapters of the A.F.A. were co-operating to the fullest extent to make this a successful convention.

The chapter voted to postpone the regular May meeting until the second Friday in June so as not to conflict with the national convention. The meeting will be held at Elmira, N. Y. Following the short business meeting, Mr. Washburn addressed the gray iron foundrymen present on, "The Production and Sale of Jobbing Castings." Mr. Washburn remarked that there are 3400 gray iron jobbing foundries in the United States and Canada, and that approximately 85 per cent of these foundries employ an average of 10 to 100 men while the other 15 per cent employ from 100 to 400 men.

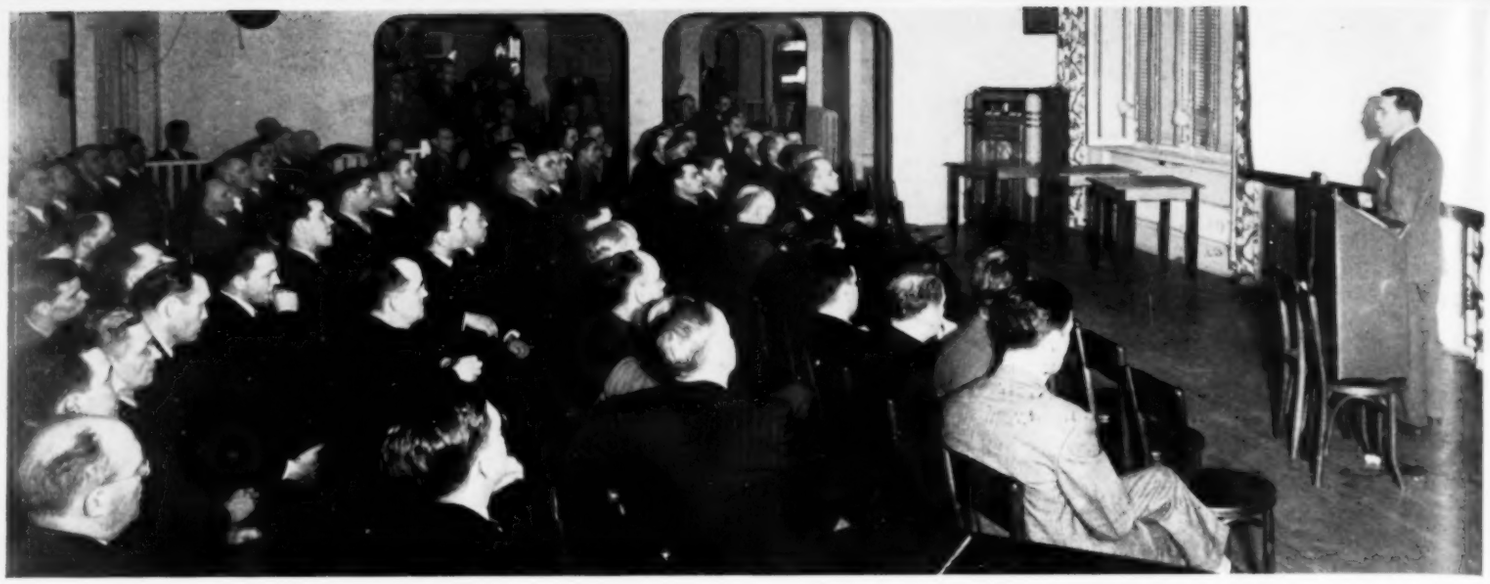
Therefore, the majority of the gray iron jobbing foundries are small institutions and operate with a minimum of overhead. This is one of the principal reasons so many of the foundries do not keep accurate cost records. In order to operate successfully during good times and bad, a foundry should know what it is costing to produce castings. Some foundries take advantage of increased industrial activity to raise prices as high as possible and when business activity declines, take in casting work for less than it costs them to produce. This practice is unnecessary if the foundries will keep accurate cost records and operate at all times on a fair profit basis. Casting buyers will not ask foundries to produce castings for less than their operating cost if the foundries are able to show them accurate cost figures and will cooperate with them at all times. In other words, if the foundries will cooperate with the customers and agree on a normal cost, the ups and downs of the foundry business will be small in comparison.

Joseph Nixon, Whitehead Metal Products Co., addressed the nonferrous group on the subject, "Gating and Risering of Nonferrous Castings." He illustrated with lantern slides the wrong and correct method of gating various castings. The photographs were particularly well liked by the foundrymen as they demonstrated better than pages of theoretical data how sound castings can be obtained. The advantages of nickel additions also were discussed. The speaker emphasized that nickel is not a cure all. Only with proper gating and risering can satisfactory results be obtained. A question and answer period concluded this informative lecture.—*L. D. Wright, secretary.*

Pittsburgh

ANNUAL nonferrous meeting of the Pittsburgh Foundrymen's Association featured a talk by Earl J. Bush, superintendent of the brass foundry, Washington Navy yard, Washington. Mr. Bush outlined the procedure being used by the Navy in production of nonferrous castings in connection with the defense program. He laid particular emphasis on the necessity of adequate gating and heading and proper melting practice, as well as the use of first grade raw materials, in order to meet strict Navy specifications. Mr. Bush showed a large number of slides covering production of intricate nonferrous castings, some of which were produced by pressure casting methods and which featured a wide range of bronzes, nickel al-

Partial picture of the group who attended the meeting of the Central Indiana chapter which was addressed by R. L. Lee
Photographer, Central Photo Service, Indianapolis



Celebrating Flint-Saginaw night, about 175 members and guests of the Detroit chapter met at the Casa Loma club, Flint, Mich., April 17, to hear W. H. Doerfner of Saginaw Malleable Division, shown here at the lectern, with a part of the audience at the left

loys, and aluminum alloys. Rough finish tolerances on some of the Navy specifications, according to Mr. Bush, give a leeway of plus or minus of 0.002-inch. In a few cases, the rough finish tolerance is considerably less than that, particularly on parts requiring extreme accuracy, such as range finding apparatus.

As a preliminary to Mr. Bush's talk, C. Warren Stapleton, senior field representative, United States Department of Labor, apprenticeship unit, outlined the job that his division is doing in setting up apprentice training programs and urged that all foundrymen in the Pittsburgh district devote some time to a study of what the government is planning to do, how it will supply the labor needs of foundries, and how it is co-operating with labor unions in establishing apprentices in the shops.

Nominating committee reported at the meeting the slate of officers for the fiscal year beginning July 1, 1941. They are: Charles J. Scheck haus, Union Spring & Mfg. Co., president; W. Hays Satterfield, Pittsburgh Steel Foundry Co., vice president; and C. H. Paul, Mackintosh-Hemphill Co., secretary-treasurer. The newly nominated executive committee consists of: H. P. Spilker, Sterrit Thomas Foundry Co.; Thomas A. Reynolds, McConway & Torley Corp.; Harry Kennedy, Continental Roll & Steel Foundry Co.; E. C. Buerkle, National Bearing Metal Co.; and William J. Laird, Westinghouse Electric & Mfg. Co. The slate will be voted on at the May meeting, which will wind up the technical sessions for the year.

W. S. Scott, Pittsburgh Coke & Iron Co., and chairman of the entertainment committee, gave preliminary report on the annual picnic and outing which will be held in June at the Chartiers Heights Country Club. The association also was honored to have as its guest, S. P. Cuthbert, former executive and trustee of the foundry fund.—*R. L. Hartford.*

Philadelphia

APRIL 18 meeting of the Metropolitan Philadelphia Chapter was held in the assembly room of founder's hall. Girard College, Philadelphia. Dinner was served to 135 members and friends of the chapter, and was followed by a talk on the "History of Girard College" by Owen D. Evans, well known educator and superintendent of the mechanical school at the college.

Stephen Girard, who amassed a sizable fortune as a banker, merchant and trader during the early part of the eighteenth century, died in 1831 at the age of 81 leaving six million dollars to found a school for orphan boys between the ages of 6 and 18. The school was started in 1840 and the first buildings completed in 1848 at which time about 300 boys were enrolled. The college now has 1700 boys and the endowment exceeds eighty-five million dollars.

A tour of the grounds and buildings was conducted by G. Curtis Pritchard, assistant superintendent of admission and discharge, and it was most interesting to see the boys on actual production work in the machine shop, carpenter and pattern shop, printing plant, foundry and sheet metal shop, and auto repairing. Everywhere the latest types of machinery and equipment

(*Continued on page* 82)

Another view of the group attending the April 17 meeting of the Detroit chapter held at the Casa Loma club, Flint, Mich., to celebrate Flint Saginaw night

EVERDUR INGOTS

A copper-silicon alloy

Properties • Foundry Practice • Applications

ANACONDA
from mine to consumer

The nominal composition of Everdur Ingots is Copper, 94.90; Silicon, 4.00; Manganese, 1.10. This composition will meet the requirements of recognized standards such as Navy Specification 46B28 and Federal Specification QQ-C-593.

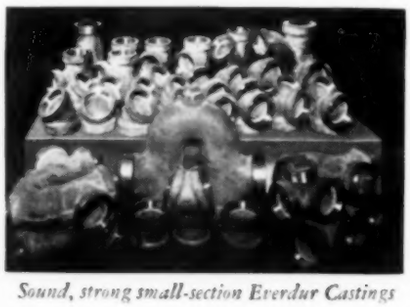
Everdur standard test coupons cast in green sand will have these approximate physical properties:

Tensile Strength	50,000 p.s.i.
Yield Strength*	20,000 p.s.i.
Elongation	25% in 2″
Reduction in Area	*25%
Brinell No.	80
(10 mm. ball, 500 Kg. load)	

*At 0.50% elongation under load

General Properties

Melting Point	1832°F. (1000°C.)
Specific Gravity	8.23
Weight	0.297 lb. per cu. in.
Pattern Maker's Shrinkage	5/16″ per ft.



Sound, strong small-section Everdur Castings

Everdur has been successfully used over a 15-year period for the production of strong, sound castings. It is furnished ready for use in 25-pound notched ingots and can be melted and cast by regular brass and bronze foundry equipment.

Cast Everdur manifold. Weight 1,714 lbs.

Foundry Practice

Anaconda Publication E-1, offered free, presents a *detailed* discussion of foundry practice with Everdur.

Contents of this publication include suggestions for composition and control of the charge; types of furnaces for melting; fluxing and melting procedure; practices in molding, types of sand, core construction, pattern making, gating, etc. Pouring data are presented, as well as detailed instructions for the cleaning and finishing, machining, welding and heat treating of Everdur castings.

Summary

Everdur copper-silicon alloy for casting purposes is a high-strength material, relatively inexpensive but possessing many of the desirable properties usually associated with higher-priced metals.

Everdur offers outstanding resistance to a large number of normally corrosive solutions and atmospheres. Obviously, it is not equally resistant to all. Information regarding the corrosion resistance of Everdur under specific conditions may be obtained from the Technical Department of The American Brass Company. This service is available without cost.

Anaconda Publication E-1, 5th Edition, contains detailed information on general properties, charging, melting, molding, pouring, etc., of Everdur Metal. Write for a copy. 41153

Everdur Metal

THE AMERICAN BRASS COMPANY

General Offices: Waterbury, Connecticut

In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ont.—*Subsidiary of Anaconda Copper Mining Co.*

EVERDUR is a trademark of The American Brass Company, registered in the United States Patent Office

(*Continued from page* 80)

have been installed. It is no wonder these boys are in demand after graduation with the training in the various shops which they receive under most capable instructors—a real key training ground for national defense. After the tour the group assembled in the chapel and listened to a talk by Robert T. Anderson, chief engineer, on the construction of the various buildings. He explained in detail the amplifying system in the chapel and stated that founder's hall was one of the first fireproof buildings in the country—built in 1848—yet contained no steel or concrete. It is built of marble and holds the tomb and statue of Stephen Girard, and on permanent exhibition are the antique furnishings of Girard's Philadelphia home.

There was no technical session, but it was a most successful meeting. Everyone left with a feeling of great pride that in Philadelphia at Girard college, orphan boys are given not only book learning but are taught a trade so as to make them good and useful citizens and well fitted to take their places in society.

John Robb, chairman of the entertainment committee, announced Wednesday, June 11, as the date for the chapter's annual picnic, the place to be announced later.—*J. T. Fegley, chairman, publicity committee.*

N. California

PROGRAM of the April 18 meeting of the Northern California Chapter held at the Lake Merritt Hotel, featured sectional discussions. There were 56 at dinner and Ivan L. Johnson, chairman of the chapter presided. A. F. Mainzer, Pacific Brass Foundry, who is the oldest foundryman in the group, and who still is active in the business with his son and grandson, was introduced. Following dinner the groups separated to their choice of subjects.

George W. Stewart, Pacific Brass Foundry of San Francisco Inc., was in charge of the nonferrous group and led the discussion on "Gas Melting Furnaces in the Nonferrous Foundry," by E. W. Williams, from the June, 1941 *Transactions.*

Charles Hoehn Jr., Enterprise Foundry Corp., San Francisco, used a delineascope to illustrate his talk on, "Chaplets and the Steel Castings," by H. F. Taylor and E. A. Rominski, published in *Transactions*, March, 1941.

James L. Francis, Vulcan Foundry Co., Oakland, Calif.., also used a delineascope for his presentation of, "Influence of the Mold in Shrinkage in Ferrous Castings," by H. L. Womochel and C. C. Sigerfoos, also published in *Transactions*, March, 1941.

Each of the three groups had a good attendance and the discussion was not left to the leader only.

Exactly 72 attended the May 9 meeting of the Northern California Chapter at the Alexander Hamilton Hotel, San Francisco to meet E. K. Smith, Electro Metallurgical Co., Detroit, and hear his talk on, "Ladle Additions to Cast Iron." Mr. Smith was on the Pacific Coast for a threefold purpose. First, he was on vacation; second he had promised in October, 1940, to be with the chapter May 9; and third, he was scheduled to take part on the program for the Foundrymen's Day at the Western Metals congress and exposition at Los Angeles, May 19 to 23. The group enjoyed Mr. Smith and profited by his talk. Had he been telling a detective story he would not have been given more attention.

Several announcements were made and included reference to the A. F. A. convention in New York, the Western Metals congress at Los Angeles and the chapter's annual meeting and ladies night set for June 20. The nominating committee report recommended E. M. Welch, American Manganese Steel division, Oakland for Chairman, F. A. Mainzer, Pacific Brass Foundry of San Francisco, San Francisco, for vice chairman, George L. Kennard, secretary-treasurer. Directors for a 2-year term, past chairman, S. D. Russell, Phoenix Iron Works, Oakland, retiring chairman Ivan L. Johnson, Pacific Steel Casting Co., Berkeley, Howard Detro, American Radiator & Standard Sanitary, Richmond, and Richard Vosbrink, Berkeley Pattern Works.

Immediately following the dinner a remarkable exhibition by the city of Berkeley police department of two of its highly trained dogs in charge of C. A. Roy, trainer and Officer Charles W. O'Meara was presented.—*George L. Kennard, secretary-treasurer.*

Ontario

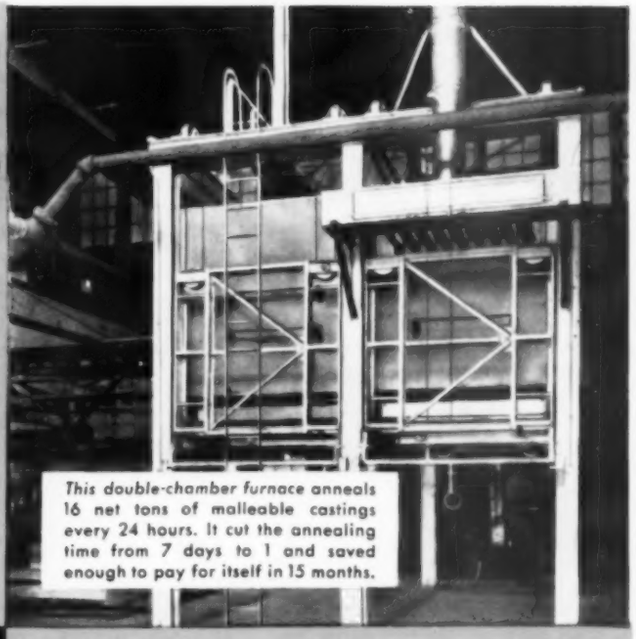
MEETING of the Ontario Chapter at Rock Garden lodge, Hamilton, Ont., March 28, drew foundrymen from a wide area extending to Oshawa, Orillia, London and St. Catherines. D. M. Storie, Fittings Ltd., Oshawa, and chairman of the chapter, presided. The report of the membership committee indicated a membership of 97 and promises made on the spot which were subsequently fulfilled brought the chapter to the 100 mark. The prize of the evening was donated by Canadian Foundry & Equipment Co. Ltd.

The subject of sand is of never-failing interest, and M. L. McGuire, George F. Pettinos Inc., presented some very practical information upon the relationship between good sand and good castings. Great progress has been made in recent

(*Continued on page* 84)

Principal speaker at the April 18 meeting of the Wisconsin Chapter was the Hon. Hamilton Fish Jr., member of Congress from New York, and the view at the left shows him at the speakers' table with Ben Claffey at his right and Bill Hambley at his left. Photos courtesy John Bing, A. P. Fire Brick Co., Milwaukee

RUSH ORDERS Are a Cinch for These 2 Electrics



This double-chamber furnace anneals 16 net tons of malleable castings every 24 hours. It cut the annealing time from 7 days to 1 and saved enough to pay for itself in 15 months.

This single-chamber furnace is ideal for small or intermittent production. Can be supplied with built-in auxiliary cooling system.

Special orders and odd lots can be annealed in a hurry in these elevator-type furnaces

HERE are two versatile, short-cycle electric furnaces that anneal pearlitics, special metals, or regular malleables quickly and profitably—and give you uniform, rejection-free results.

Big producers find either of them ideal as a supplementary unit to anneal special or rush jobs that can't be handled profitably in regular equipments. For the small annealing department, either of these furnaces provides an efficient, economical unit for regular production.

THESE FEATURES MEAN SHORTER ANNEALING TIME AND LOWER ANNEALING COSTS

1. Packing compound and heavy, closed containers are unnecessary. This means shorter time for heating and cooling, improved working conditions, and lower costs.

2. Rejects are practically eliminated because accurate, automatic temperature control and uniform heat distribution throughout the charge make for great precision in the heat treatment.

Put one of these ***standard***, tried and proved furnaces to work in your heat-treating department and let it demonstrate its versatility in handling your toughest special orders. Complete information on request. Write the heating specialist in the nearest G-E office, or General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

ADVERTISING PAGES REMOVED

(*Continued from page* 82)

years in selecting, handling, and conditioning foundry sand, and money spent for conditioning units nearly always has been an excellent investment. Control of moisture content is of the highest importance in maintaining foundry sand and failure to make proper provision for this vital factor may result in many casting troubles.

While no general rules can be laid down there is an ideal moisture content for every sand which results in the best combination of strength and permeability. Generally the finer the sand and the greater the amount of clay used with it, the higher the percentage of moisture required. A sand with 10 to 15 per cent clay will need 5 to 7 per cent moisture while with a bond of about 4 per cent bentonite, 2 to 3 per cent moisture may be sufficient.

Another essential factor in sand maintenance is the removal of fines which tend to plug up the sand, reducing its permeability. Fines may be removed by suction or by water washing methods. Little progress has been made in the reclaiming of core sands, a coating of carbon which is undesirable remaining on the grains, after the oil is burned out. Whether it is more economical to replace sand or to install equipment for removal of fines depends upon the size of the foundry and operating conditions.

In purchasing foundry sand the shape of the grains is not stressed as much as some years ago but the fact remains that angular or semiangular grains are characterized by better bonding. Uniformity of particle size is also important, as is durability, although this last property is probably associated more closely with the clay than with the sand.

Mr. McGuire discussed some of the general problems of the foundry including the correlation of design with easy casting practice. He stressed the need for an increased measure of co-operation between the engineer and the foundryman, especially under present conditions where new designs continually are being encountered. Some slides were shown illustrating the methods employed in gathering and handling foundry sands, and a series of slides also served to demonstrate some interesting causes of defects and their cure.

Another of the popular group meetings of the Ontario Chapter was held on April 25 at the Rock Garden Lodge, Hamilton, Ont., with chapter chairman, D. M. Storie, Fittings Ltd., Oshawa, Ont., presiding. This was the annual meeting of the chapter and the following officers were elected: Chairman, N. B. Clarke, Steel Co. of Canada Ltd.; vice chairman, J. J. McFayden, Galt Malleable Iron Co., Ltd. Directors elected for a term of three years, T. Clough, Dominion Wheel & Foundries Ltd., T. D. Barnes, William R. Barnes Co. Ltd., J. Cunningham, International Malleable Iron Co. Ltd., and Robert Robertson, International Harvester Co. of Canada Ltd. G. L. White, Westman Publications Ltd., continues as secretary-treasurer.

The malleable iron group, under the leadership of J. J. McFayden, Galt Malleable Iron Co. Ltd., was addressed by Dr. W. R. Bean, Whiting Corp. Dr. Bean discussed malleable duplexing from the angle of development of a process, early experiment and failures, overcoming of difficulties, present successful installations, comparative costs and limitations which call for not less than 30 tons of melt per day to justify the investment.

In the nonferrous group, under S. R. Francis, Metals and Alloys Ltd., a number of problems of particular interest in the field were discussed. These included the gating of manganese bronze test bars, the gating of manganese bronze bushings, depending upon their size; and a discussion of the operation of coke and oil fired crucible furnaces.

The gray iron session was conducted by R. C. Stewart, Apco Petroleum Products Ltd., and W. Sullivan, General Steel Wares Ltd. Mr. Stewart discussed a foundry problem where the core would not drop completely out of a casting, but left a black ring on the inside as if burning had resulted from the use of poor sand. However, a microscopic examination of the area revealed that it was about one-half sand and one-half iron, showing that the hot iron had penetrated about one-quarter of an inch into the sand core. The addition of silica flour to the sand corrected this difficulty and gave good castings.

It was later discovered that the trouble had arisen through separation of sand into zones of varying particle size during shipping and storing. In the discussion on this subject it was pointed out that iron sand cores could be detected by either magnetic or specific gravity tests. Silica flour was recommended for use in cores for heavy castings while silica sand was sufficient for

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Vice Chairman Louis Desparois and Secretary Jack Kelin of the St. Louis chapter picking out the prize for another winner

(*Continued from page* 84)

lighter castings. Generally, the carbon value of any iron is determined by the amount of silicon added and the cooling rate of the molten iron as it comes from the cupola.

Lately, however, because of the need for iron with special properties, there is a tendency to obtain increased carbon values by raising the height of the tuyeres four to six inches. The coke bed is also raised by the blast pressure lowered. Another interesting discussion centered around the use of lead pots containing 2 per cent nickel as premium scrap iron. When this material was heated in the cupola and poured into castings, a dross substance came to the top which contained neither lead nor nickel. An examination of one of the original pots revealed a yellow material in the crevices along the inside. The iron in the pot itself contained no nickel. When some of the material was scraped out with a penknife, and analyzed, it was found to be nickel oxide. The explanation offered was that lead, being an excellent solvent for nickel, had leached it out of the iron.—*G. L. White, secretary-treasurer.*

Wisconsin

REGULAR meeting of the Wisconsin Chapter was held April 18 with 350 members and guests present. President B. D. Claffey presiding, announced the results of the election of new officers: President, A. C. Ziebell, Universal Foundry Co., Oshkosh, Wis.; vice president, H. C. Waldron, Nordberg Mfg. Co., Milwaukee; secretary, George Dreyer, Ampco Metal Inc., Milwaukee; treasurer, R. F. Jordan, Sterling Wheelbarrow Co., Milwaukee. Directors elected for 3 years: William Hambley, Allis-Chalmers Mfg. Co., West Allis, Wis., John Bing, A. P. Green Fire Brick Co., Milwaukee. Through the courtesy of the Wauwatosa High school, the A Capella choir under the direction of Gladys Garness, entertained with several selections.

The speaker of the evening, Hamilton Fish, representative from New York, and member of the House Foreign Affairs committee, spoke on "America Looks Ahead." He stated that the nation was at the cross roads and must choose a path to follow. The greatest issue that confronts the American people is the convoying of ships to Britain. Convoying and war are inseparable, —no convoying, no war. Congressman Fish expressed his fears as to the result of the huge spending program, and if lasting several years, the monumental national debt may cause a national structure collapse. He further stated that our free institutions are the hope of the world but there is great danger of communists, fascists and naziism preaching the gospel of hate in destroying these institutions. He believed Congress should enact deportation laws to send the *ism* supporters back to their foreign homes and give their jobs to loyal American citizens.—*H. C. Waldron, secretary.*

S. California

MORE than 140 foundrymen attended the meeting of the Southern California Chapter held at the Los Angeles Elks Club, May 1. N. J. Dunbeck, vice president, Eastern Clay Products Inc., Eifort, O., gave a fine talk on the history and various types of bentonites used in synthetic foundry sands. He described methods of introducing bentonites and various clays into the foundry systems. He then led a general discussion that brought out many questions and answers which proved of interest to all in attendance. The entertainment committee showed moving pictures of the "Gay Nineties" and other old time pictures.

Pasquale Arpea, chairman of the nominating committee announced the committee's choice of officers for the coming year as follows: President, B. G. Emmett, Los Angeles Steel Castings Co.; vice president, Earl Anderson, Enterprise Foundry Corp.; secretary, W. D. Bailey Jr., Pacific Metals Co.; treasurer, Gordon Sondraker, Chamberlain Co. Directors nominated for 2 years: W. F. Haggman, Foundry Specialties Co., Earl Shoemaker, Kay-Brunner Steel Products Inc., D. A. Luper, Grayson Heat Control Ltd., Bert Campbell, Dayton Foundry Co., E. M. Hagener, General Metals Corp. James E. Eppley, Kinney Iron Works, retiring president was nominated to serve on the board for one year.—*W. F. Haggman, secretary.*

Detroit

CONTINUING a policy of greater co-operation with foundrymen in out-state districts, the Detroit Chapter held its April 17 meeting at the Casa Loma Club, Flint, Mich., designating the occasion as Flint-Saginaw night. Attendance was close to 175, the majority of those on hand being from foundries in the Flint, Saginaw, Bay City, Midland and adjacent areas. The evening opened with professional entertainment during the dinner period, after which W. H. Doerfner, head of the Saginaw Malleable Iron division, presented a discussion on the efficient handling of men and materials in that plant. Illustrating his comments with a series of slides, he outlined steps which have been taken in routing of materials to simplify production tasks and to improve economy of operations.

This division currently is producing castings at a record pace and is being expanded to increase output further. Continuous research is being carried out on new applications for malleable iron and Armasteel castings, both for defense and non-defense uses.

Following formal presentation of the subject by Mr. Doerfner, a question period was launched and several department heads from the Saginaw plant took turns at responding to queries from the audience.

The meeting was an unqualified success and demonstrated the interest of foundrymen in the district in attending technical meetings. Further meetings of this character are being planned, and two men from the district have been added to the chapter's board of directors for next year. They are Carl F. Joseph, Saginaw Malleable Iron division, Saginaw, Mich., and O. E. Sundstedt, General Foundry & Mfg. Co., Flint.

Incidentally, Mr. Sundstedt took charge of arrangements for the April 17 meeting and a lion's share of the credit for its success should go to him.—*A. H. Allen, secretary.*

Western Mich.

OFFICERS of the newly organized Western Michigan Chapter were announced at the May 5 meeting held at the Occidental Hotel, Muskegon, Mich. Robert E. Kennedy, secretary of the American Foundrymen's Association read the names of the officers elected by the board of directors for the coming year: Chairman, D. F. Seyferth, West Michigan Steel Foundry Co., vice chairman, C. F. Lonnee, Muskegon Piston Ring Co., secretary-treasurer, Max A. Amos, Standard Automotive Parts Co. Mr. Seyferth then announced appointments of the following committes: Program committee, chairman, A. E. Jacobsen, Grand Haven Brass Foundry, Paul Lane, Muskegon Piston Ring Co., C. Locke, West Michigan Steel Foundry Co., C. P. Ziegler, Grand Rapids Foundry; membership committee, chairman, R. Clark, Lake Foundry & Machine Co., R. Teach, Werner G. Smith Co., J. Livingston, Blackmer Pump Co. He also announced that preliminary plans had been made for a big chapter outing to be held in September.

M. E. Johnson, chief inspector of Caterpillar Tractor Co., Peoria, Ill., was the principal speaker of the evening. Mr. Johnson supervises a

staff of 450 inspectors in watching the quality of work leaving the Caterpillar organization. Mr. Johnson stated that inspection was important in order to be sure imperfections will not hamper production, and quality of product turned out. Inspection department should be considered a service department and no pattern changes should be made without full knowledge and consent of buyer of castings. He also stated that too much correction by welding is made rather than attention to design and actually making the casting right in the first place. Mr. Johnson described the shifting of inspectors from one department to another, and the educational program, so that individual inspectors understand the responsibility demanded of them. He showed interesting slides illustrating points of importance throughout the talk after which he answered many questions regarding problems of inspection.—*M. A. Amos, secretary-treasurer.*

Chicago

ANNUAL business meeting and round table discussions of gray iron, malleable, steel and nonferrous groups, comprised the program for the final 1940-41 meeting of the Chicago Chapter, at the Chicago Towers club, May 5. With an attendance of about 200, the chapter marked the conclusion of a most successful year in point of membership and technical and educational activities.

Following the customary reports of committee chairmen, new officers were elected for the coming year. L. L. Henkel, metallurgist, Interlake Iron Corp., and vice chairman, was named the new chairman. A. G. Gierach, assistant plant manager, American Brake Shoe & Foundry Co., Chicago Heights, Ill., was

(*Continued on page* 90)

Old Timers—Some Timers—Young Timers night at the Northeastern Ohio on May 8 brought out a large crowd. Photos courtesy Sterling Farmer, Sand Products Corp., Cleveland

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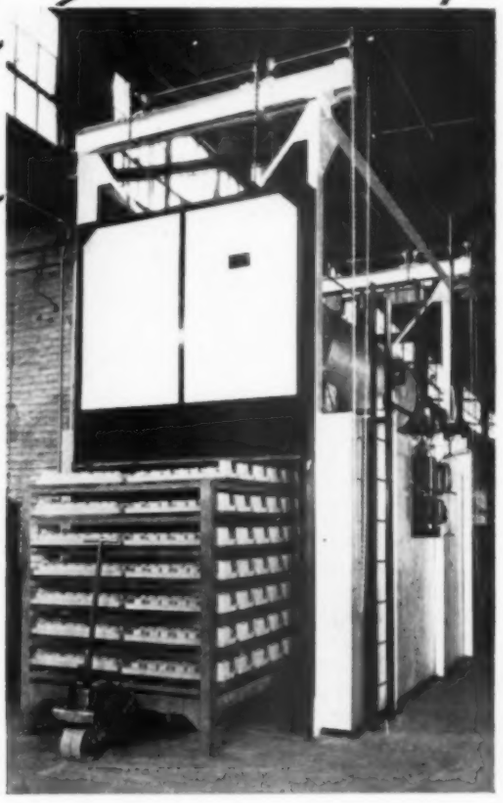

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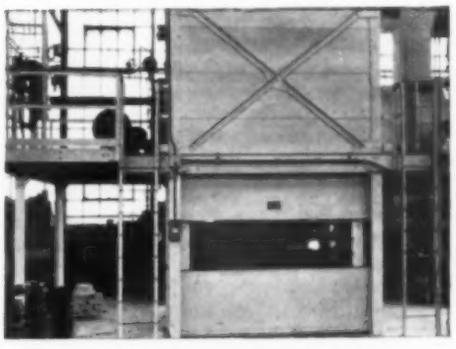

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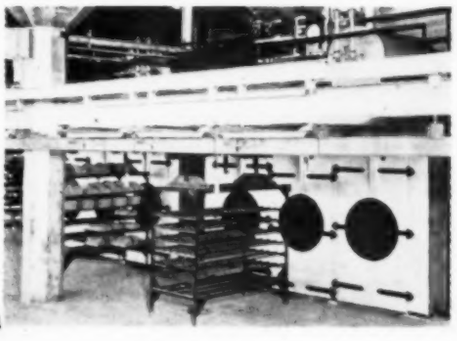

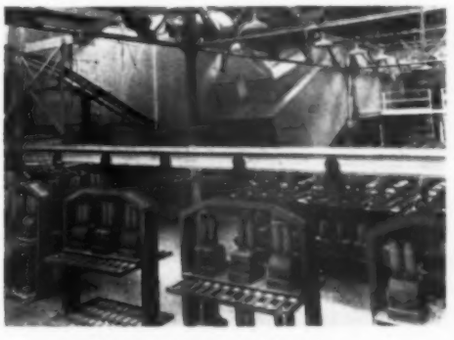

Monorail Conveyor Core Oven

Left: Rack Type Core Oven

(*Continued from page* 88)
elected vice chairman. Charles C. Kawin, president, Charles C. Kawin Co., and B. L. Simpson, vice president, National Engineering Co., were re-elected treasurer and secretary, respectively. New directors were named as follows: Three years, retiring chairman Garnet P. Phillips, chief metallurgist, Automotive Foundry division, International Harvester Co., John W. Porter, manager, American Steel Foundries, East Chicago, Ind., J. F. Lammering, vice president, Hammond Brass Works, Hammond, Ind., D. N. Gellert, president, Nichol Straight Foundry Co.; two years, J. D. Burlie, foundry engineer, Western Electric Co.; one year, Arthur Klopf, vice president and general manager in charge of foundry division, Hansell-Elcock Co.

As a token of appreciation of his service to the chapter during his term as chairman, Mr. Phillips was presented with the past chairman's statuette.

"Controlled Moisture in Cupola Blast," was the discussion topic for the gray iron round table with R. G. Guthrie, chief metallurgist, Peoples Gas Light & Coke Co., as the leader. Speakers were F. M. Johnson, sales manager, Air Conditioning division, Surface Combustion Corp., Chicago; Glover Strong, Chicago district manager Carrier Corp.; and C. J. Lonnee, general plant superintendent, Muskegon Piston Ring Co., Sparta, Mich. It was brought out that control of moisture in the blast is the only important element in cupola operation which is not generally under uniform control. Depending upon seasons of the year, temperature and atmospheric conditions, quantity of moisture in the blast may vary as much as 1 ton per hour. Equipment is available for removing excess moisture or adding necessary moisture to keep the saturation at a fixed point, and experience shows not only can coke consumption be reduced but the iron will be held under more uniform chemical analysis. Principal benefit is in holding silicon content uniform.

Malleable round table considered "Effect of Manganese on Second Stage Graphitization," with C. B. Stantial, foundry superintendent, Illinois Malleable Iron Co., as the leader. Principal speaker was George H. Minert, assistant metallurgist, Gunite Foundries Corp., Rockford, Ill.

"Controlled Directional Solidification," was the topic for the steel round table with C. E. Westover, manager of operations, Burnside Steel Foundry Co., leading the discussion. A paper on the subject was presented by F. A. Melmoth, vice president and works manager, Detroit Steel Casting Co., Detroit.

Nonferrous group devoted its attention to "Recent Developments in Furnace Design To Meet Demands Set Up by Defense Industry," under the leadership of Charles McKelvey, general manager, brass foundry, Chicago Hardware Co., North Chicago, Ill. T. J. Myall, sales manager, Fisher Furnace Co., Chicago, presented the principal paper.—*E. F. Ross.*

Chesapeake

ONE hundred members and guests were present for the "Information Please" program of the Chesapeake Chapter held April 25, at the Engineers' Club, Baltimore. The board of experts included Earl J. Bush, U. S. Navy Yard, Washington, who answered questions on nonferrous practice; Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., who discussed cast iron and Bert Troy, Dodge Steel Co., Philadelphia, who took care of the questions on steel. Members were invited to submit their problems to the experts and after the general question and answer period the membership divided into nonferrous, cast iron and steel groups where further discussions were carried on.

N.E. Ohio

APPROXIMATELY 100 members and guests of the Northeastern Ohio Chapter A.F.A. heard two interesting and instructive talks on widely divergent subjects at the April 10 meeting, held in the Tudor Arms, Cleveland. The first or coffee talk on "The Weather" was presented by George Andrus, United States Weather Bureau. Mr. Andrus modestly disclaimed any control over the weather, but in an entertaining and witty manner he presented reasons to prove his contention that all weather is good weather. A temporarily unpleasant condition in one area is compensated by favorable conditions in another area. He outlined the work and duties of the weather bureau in a manner that should placate even the most inveterate grumbler or grumbleress when occasionally, the weather does not coincide with the daily prediction. Replying to a question from the floor on how far the weather man could peer into the future he admitted that he could not predict the weather for June 28, but he would pull all the possible strings to insure perfect weather for the Northeastern Ohio Chapter annual outing and field day.

Elmer J. Carmody, foundry engineer on the staff of Charles C. Kawin Co., Chicago, presented a paper on the subject of gates and risers for castings. The subject he said has engaged the attention of many individuals and foundry groups in recent years, but presents so many phases and ramifications that it cannot be covered adequately within the conventional time limits set for any subject at the usual type foundry meeting. He briefly reviewed the work of several authorities who in recent years have covered the subject from various angles at conventions, regional conferences, monthly meetings and in THE FOUNDRY.

Diversity of opinion among foundrymen on the subject of gates, position, size and shape, is as wide as that which prevails among members of any of the learned professions in their particular fields. All are agreed that the gate passage should admit metal to the mold quietly, rapidly and in clean condition. Risers or feeders should be provided to compensate for the metal which shrinks during the cooling process. Theoretically, clean metal from the ladle should enter the mold in the same condition. In the main, actual practice coincides with theory. However, the hazard of foreign material in the metal stream always is present. Hence, the precautionary measure of using a gate that will catch any of this material at some point between the sprue mouth and the gate entrance. The speaker presented a number of slides to illustrate his views and many phases of gate and riser design and application.

At this meeting Otto H. Harer, vice president and general manager, Art in Bronze Co., Inc., Cleveland, presented the chapter with a handsome bronze plaque containing the words of the familiar Pledge of Allegiance to the flag of the United States.—*Pat Dwyer.*

Nearly 300 members and guests attended the May 8 meeting of the Northeastern Ohio Chapter held at the Cleveland club, Cleveland. Since the meeting was the last to be held indoors for this year President Fleig arranged an innovation which was termed, "Old Timers-Some Timers-Young Timers Night," and on which the old time foundrymen and the young apprentices were guests of honor of the chapter. Free refreshments and songs by a well known quartet added zest to the proceedings. Ellis Van Der Pyle, sports announcer, radio station WHK, Cleveland, gave a short talk on a number of famous athletes he had met over a period of years. One of the high spots of the meeting was the premiere showing of a color motion picture entitled "The Story of Sand" which was prepared by Whitehead Bros. Co. Previous to the presentation of the picture Van Loan Whitehead of that firm spoke briefly.

Announcement was made during

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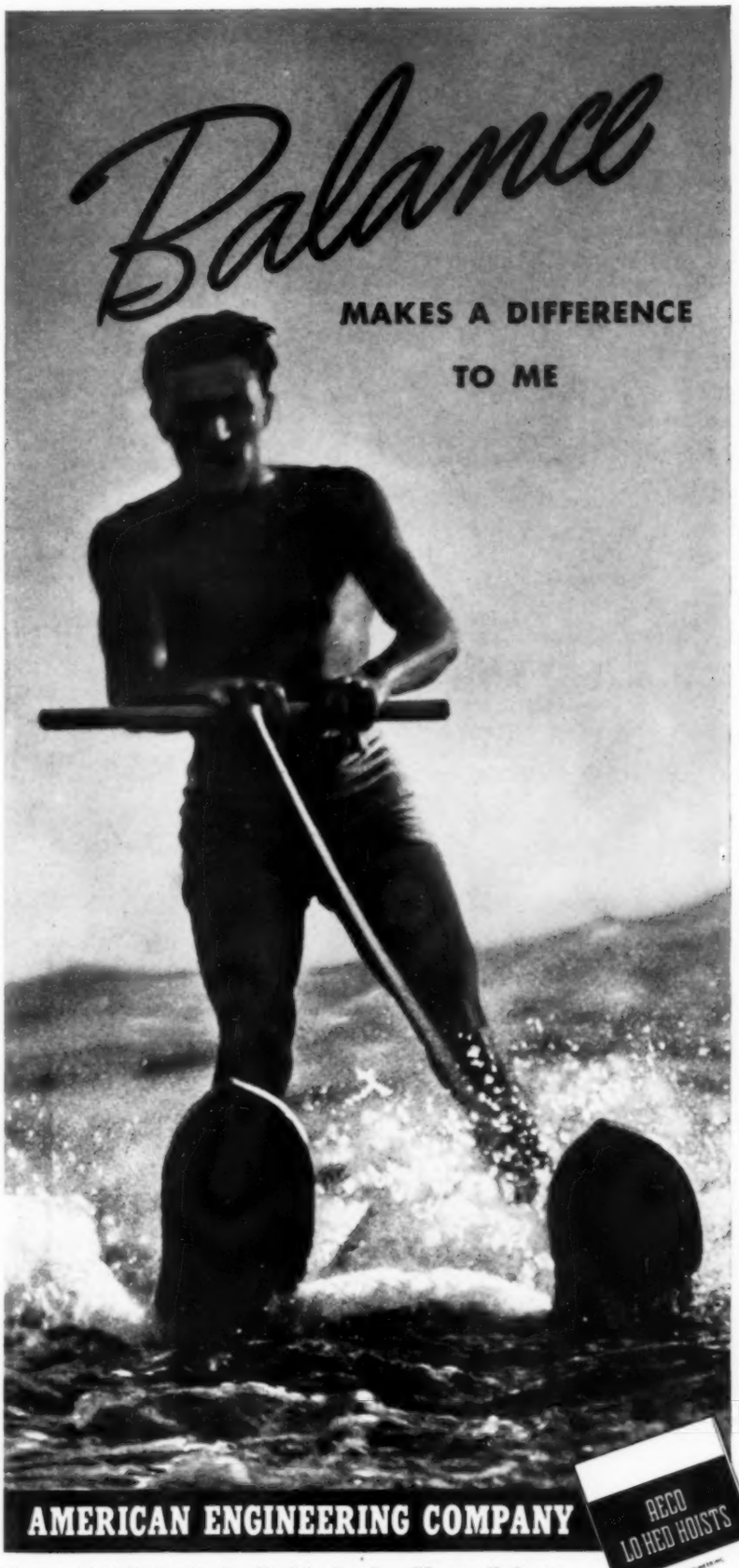

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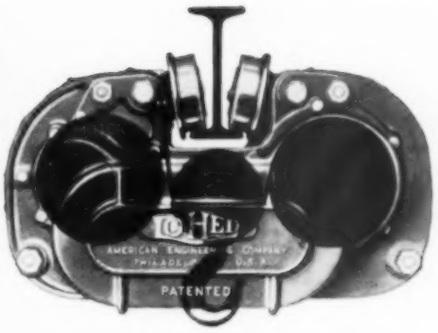

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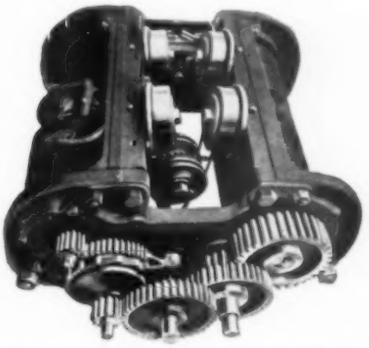

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(*Concluded from page* 90)

the meeting of the election of officers for the coming year and they include President Frank Dost, Sterling Foundry Co., Wellington, O.; Vice President John H. Tressler, Hickman, Williams & Co., Cleveland, and Secretary Jack Lathrop, THE FOUNDRY, Cleveland. R. F. Lincoln, Osborn Mfg. Co., Cleveland, was re-elected treasurer. Directors elected for three years include William Manwell, Fulton Foundry & Machine Co., Cleveland; Ray Fleig, Smith Facing & Supply Co., Cleveland; M. G. Thomas, City Foundry Co., Cleveland; Arthur J. Tuscany, Foundry Equipment Manufacturers' Association, Cleveland, and J. W. Horan, Sandusky Foundry & Machine Co., Sandusky, O. Sterling Farmer, Sand Products Corp., Cleveland, was elected to fill the unexpired term of J. H. Tressler who was elected vice president.

Annual stag outing and golf tournament of the chapter will be held on June 28 under the direction of L. P. Robinson, chairman of the entertainment committee. — *Edwin Bremer, publicity chairman.*

St. Louis

MAY 8 meeting of the St. Louis District Chapter, designated as the annual business meeting and round table discussion, was well attended. Following the dinner, the business session was opened with the presentation of a plated gavel to retiring Chairman W. Carter Bliss, as a token of his year's service as chief executive of the chapter. The secretary-treasurer then presented the annual report and financial statement, both indicating a year of encouraging progress as well as a sound financial condition. The various committees then gave summaries of their activities. Special attention was drawn to the forthcoming picnic by entertainment chairman, M. A. Bell, who pointed out that June 14 had been designated as the date for the annual outing to be held at Joe Davies' Country Club, Ferguson, Mo.

Emil Goerger, City Pattern Co., submitted the report of the nominating committee. In this report L. J. Desparois was nominated as chairman for the coming year. At the conclusion of the nominating committee's report Mr. Desparois declined the nomination with thanks. He indicated that although he deeply appreciated the honor, it was his opinion that the chairmanship of the chapter should be held by one who is an operating foundryman. Mr. Desparois then nominated Carl Morken, Carondelet Foundry Co., to be chairman. Roy Jacobsen, Carondelet Foundry Co., who had been nominated as a director, then declined his nomination and in his stead, placed the name of L. J. Desparois. Mr. Jacobsen pointed out that the service rendered by Mr. Desparois to the chapter over a period of years had been very encouraging and insisted that this be accepted as a token of recognition. Final officers as elected are as follows: Chairman, Carl Morken, Carondelet Foundry Co.; vice chairman, C. B. Shanley, Semi-Steel Castings Co., secretary-treasurer, J. W. Kelin, Federated Metals division, American Smelting & Refining Co. Directors elected for three-year term: L. J. Desparois, Pickands, Mather & Co.; H. Goodwin, Medart Co.; William McKee, Key Co.; Emil Goerger, City Pattern & Model Co.; directors for two-year term, James Roland, Fry-Fulton Lumber Co.; directors for one-year term, Francis O'Hare, Central Brass & Aluminum Co.; Walter Illig, Banner Iron Works.

There being no further business, the meeting was then divided into three groups, gray iron, steel and nonferrous, being under the chairmanships of Charles Scullin, Luther Kleber and Francis O'Hare, respectively. A most worthwhile evening of round table discussion was had by all of those in attendance at their various sessions. — *J. W. Kelin, secretary-treasurer.*

Conn. Nonferrous

THE Connecticut Nonferrous Foundrymen's Association held its monthly meeting April 16 at the Union League Club, New Haven, Conn., with D. Wesley Case, president, presiding. The speaker was M. A. Snell, Hartford Accident & Indemnity Co., Hartford, Conn., who spoke on "The Control of Foundry Hazards." Pointing out the advantages in efficiency and costs through proper attention to good housekeeping and in provision of suitable equipment to control the dust and health hazards, Mr. Snell presented a very educational discussion. There were 50 present at the meeting.

The eighth annual entertainment meeting will be held Friday, June 20, at Wilcox's Pier Restaurant, Savin Rock, West Haven, Conn., with an elaborate program planned. The entertainment committee includes: Fred B. Clarke, chairman, Louis G. Tarantino, vice chairman, C. P. Crotty, T. Joseph Judge, Stafford Chappell, Joseph Shannon, Frank Diana, Don Sawtelle, Herb Duigee, and Howard Gillis. — *Louis G. Tarantino, secretary.*

National Carbon Co. Inc., Electrode division, will open a sales office at 1810 Clark building, Pittsburgh, in charge of F. S. Haggerson.

New England Smoker Well Attended

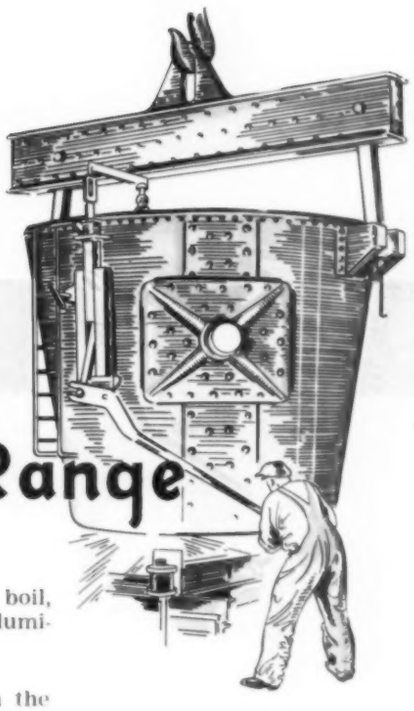
One of the most enjoyable features of the recent New England Foundryman's conference March 28 and 29 was the annual smoker and good fellowship party sponsored by representatives of foundry supplies and equipment companies. Practically all those who attended the technical sessions at M. I. T., Cambridge, also attended the party Saturday night on the Hotel Bradford roof garden. The crowd was further augmented by friends and guests from a wide New England area. Facilities of the roof garden were taxed to capacity from early evening until midnight. A full course dinner was followed by an exceptionally fine program of stage entertainment. Ray Hunter, Werner G. Smith Co., and Frank Kumer, Springfield Facing Co., served as chairman and co-chairman respectively on the committee. Other members included Harry Impey, Tabor Mfg. Co., treasurer; Herbert Klein, Klein-Farris Co., Inc.; Hugh Johnston, Ingersoll-Rand Co.; Joseph Cooney, George F. Pettinos Inc., and Wendell L. Long, Taggert & Co.

Meet at Toledo

Seventy-five foundrymen gathered at the Hillcrest Hotel, Toledo, O., April 25 for supper and to hear L. P. Robinson, Werner G. Smith Co., Cleveland talk on, "Practical Core Room Problems." Before Mr. Robinson was introduced, R. E. Kennedy, secretary of the American Foundrymen's Association, gave a brief talk on the advantage of forming a local chapter in the Toledo area. Local chairman, R. L. Binney, Binney Castings Co., Toledo, then introduced the speaker. Mr. Robinson gave a most interesting and instructive talk on core room problems and spent approximately 2 hours answering questions at its conclusion. R. A. Clark, Toledo Machine & Tool Co., L. M. Long, Bunting Brass & Bronze Co., E. C. Mathis, Pickands, Mather & Co., and V. E. Zang were members of the local committee. Foundrymen from nearby towns including Fremont, and Fostoria, O., and Monroe, Mich. were in attendance. Among the visitors was Jerome Strauss, vice president, Vanadium Corp. — *Sterling N. Farmer.*

Anglo-American Metal & Ferro Alloy Corp., New York, has organized a subsidiary to be known as the American Nickel Alloy Mfg. Corp. to manufacture nickel alloys and allied products. The company has moved from 220 Broadway to 50 Church street, New York. Alfred J. Grunebaum is president.

Foundry DEVELOPMENTS At Short Range



TO OBTAIN the desired effectiveness from a chill applied to a casting, consideration should be given to the amount of metal passing over it. Where a great amount of metal passes over the chill, it should be much heavier so that its heat absorption capacity is sufficient to take care of the extra load imposed upon it, and leave enough chilling effect after the flow of metal has ceased.

* * *

Freezing point of high purity iron (99.99 per cent) in an atmosphere of helium in 2802 degrees Fahr., and 2 degrees lower in an atmosphere of hydrogen according to an investigation by the National Bureau of Standards. The freezing point is defined as the temperature at which the melted metal starts to solidify.

* * *

A tinning compound available which simultaneously cleans, acts as a flux, and also pre-tins the surface. Designed for auto-body repair work, it also is said to be useful for bonding babbitt to hard-to-clean cast iron shells. In use the area is heated to about 550 degrees Fahr., and a few pinches of the compound sprinkled on the surface, and rubbed in briskly. While the coating still is in a molten state, the entire area is wiped with a clean rag.

* * *

According to J. Brinn in *Chemist-Analyst*, Aug. 1940, the following method is recommended for the determination of aluminum in nickel silver alloys: Dissolve 1 gram of the alloy in 15 cubic centimeters of 7 normal sulphuric acid and 2 cubic centimeters of concentrated nitric acid. Boil off nitrous fumes and filter if necessary. Dilute to 200 cubic centimeters, pour into the beaker 20 to 30 cubic centimeters of mercury and electrolyze 3 hours with a current of 2 to 3 amperes. Make the mercury the cathode and a platinum spiral the anode. After electrolysis which removes nickel, silver and most other metals, neutralize the methyl red with ammonia, boil, filter ignite and weigh the aluminum oxide.

* * *

Cylinder gate valves used in the oil industry, and operating under pressures ranging from 1000 to 5000 pounds per square inch are made of cast chromium-molybdenum-nickel steel by one firm. The composition shows 0.25 to 0.35 per cent carbon, 0.60 to 0.90 per cent manganese, 0.25 per cent minimum silicon, 0.045 per cent maximum phosphorus, 0.045 per cent maximum sulphur, 0.45 to 0.75 per cent chromium, 1.25 to 1.75 per cent nickel, and 0.20 to 0.30 per cent molybdenum. After casting the valve bodies are normalized from 1650 degrees Fahr. and drawn at 1200 degrees Fahr., and show a tensile strength of 100,000 pounds per square inch minimum, a yield point of 75,000 pounds per square inch minimum, an elongation of 18 per cent minimum in 2 inches, and a reduction of area of 35 per cent minimum. Brinell hardness is 200 to 211 The castings then are machined to grinding tolerance, oil quenched from 1500 degrees Fahr., and drawn at 1165 degrees Fahr. to produce a brinell hardness of 300.

* * *

ACCORDING to an investigation in a malleable foundry, surface checks and small cracks result from use of excess seacoal in the facing for thin castings. The casting in question was a bicycle handle bar stem, an elimination of seacoal or maintaining it at the minimum point prevented the trouble.

* * *

A crane designed for railroad service employs a cast steel hook weighing 850 pounds for handling extremely heavy loads. It is made of manganese-vanadium steel containing 0.28 to 0.38 per cent carbon, 1.20 to 1.80 per cent manganese, 0.25 to 0.50 per cent silicon, and 0.08 to 0.12 per cent vanadium. After normalizing and heat treatment the hook develops a tensile strength of 100,300 pounds per square inch, a yield point of 71,050 pounds per square inch, an elongation of 26.5 per cent in 2 inches, and a reduction of area of 54.9 per cent.

* * *

A recently developed protective ointment is claimed to be waterproof, and designed for the prevention of skin disorders caused by contact with acids and caustic compounds in dry or aqueous form. It is said to be effective against sulphuric, muriatic, nitric and many other acids, caustic metal cleaners, etc.

* * *

FLAWS in nonferrous and other nonmagnetic materials can be detected with a new eddy-current meter developed by Dr. Gunn, U. S. Naval Research Laboratory. Eddy currents set up in a test piece are compared with a predetermined pattern in a perfect test sample.

* * *

For protection against rust and corrosion a plastic coating which may be applied by spraying, painting or dipping, is said to give excellent results. The coating is claimed to be almost completely free from porosity as compared with oil and pigment coatings, possesses flexibility and good adhesive properties, and may be used as a primer or in thin coats as a rust and corrosion inhibitor.

* * *

A composition for hearth plates used in heat treating furnaces which is claimed to give excellent service contains 2.6 per cent carbon, 1.40 per cent manganese, 5.54 per cent silicon, 2.24 per cent chromium, 1.03 per cent molybdenum, 1.23 per cent nickel and 0.12 per cent vanadium. The castings are not heat treated, and made from cupola metal under carefully controlled conditions employing special pig irons and ladle additions for the alloying agents.

COMMENT

INFLUENCE of the American war effort on the foundry industry is becoming more pronounced almost daily. Difficulties in obtaining raw materials and supplies, either through priority control or shortage in supply have become more acute in recent weeks. Iron, steel and malleable foundries are confronted with a more extended price control of scrap iron and steel, as is reported on page 125 of this issue, and with a new form of inventory control to prevent the accumulation of excess stocks and supplies. Several weeks ago a new priorities critical list containing 45 new items, including all forms of cast products, was made public.

The OPACS expects the revised schedule of maximum prices for scrap iron and steel to eliminate difficulties produced by the April 3 schedule. How successful the new set up will be in providing a flow of scrap iron and steel to the points needing it most for national defense work remains to be seen. Sixteen grades of scrap have been added to the May 6 schedule.

The new form of inventory control system includes coverage for the following items having a direct bearing on the foundry industry: Copper; ferrous alloys of all types; iron and steel products including castings and pig iron; manganese or spiegeleisen; molybdenum; nonferrous alloys of all types including brass and bronze; tin; vanadium; and secondary metals, or scrap, containing any of the metals listed or already subject to control, prepared for sale in order to recover the metal content thereof.

Under the new order, a foundryman cannot ship castings to a customer if he knows the shipment will increase the inventories for any calendar month. The foundrymen is required to mail a statement of compliance to the OPM before June 1. Beginning June 10, the foundryman cannot make deliveries unless the customer supplies a sworn statement covering inventories during the preceding calendar month. At the same time, the foundryman, as a customer, must file a sworn statement of the previous month's inventories with his suppliers of raw materials listed on this order.

—□—

A RECENT address of Donald M. Nelson, director, Division of Purchases, Office of Production Management, contains the following statement:

> There is no deep, intricate mystery about selling things to the government under the defense program. You can get all of the exact, detailed information you need for the price of a 3-cent stamp. Secretary of Commerce Jesse Jones has established in his department a service and information office. If you write to that office you will be told specifically where to go, whom to see and what procedure to follow. You will be told, not merely what agency or branch buys the materials you have to sell, but what individual, in what particular office, is the man for you to see. I might add that you may not need to come to Washington at all. Army and Navy buying is largely decentralized; you may find that the procurement officer you want to see is to be found within 50 miles of your own office. Write first and find out.

—□—

IF YOUR foundry has not as yet felt the impetus of the defense program and you would like to place your plant facilities at the disposal of the government in this emergency, write to the Defense Contract Service at the nearest Federal Reserve bank or branch bank. The work of the Defense Contract Service in furthering subcontracting and thus spreading the manufacturing load, should aid materially in increasing production of the needed materials of war.

—□—

A RECENT report of the Foundry Equipment Manufacturers Association indicates the sale of equipment in April probably reached an all time high. The index of orders for new equipment was 405.3 per cent, with the monthly average of sales for the years 1937-38-39 providing the base of 100 per cent. On the base provided by the average monthly sales for 1922-23-24, which was used for many years, the index of sales for April would be 538.23 per cent.

This indicates the enormous demand which is being placed on the foundry equipment manufacturer at a time when he is having difficulty in securing an adequate supply of the various materials used in producing the equipment. Therefore don't try to use pressure to obtain early delivery of equipment that should have been ordered at least a year before you got around to the job.

—□—

IF YOU have not received a copy of the handbook on the operation of the priorities system through one of the trade associations in the foundry industry, write to the Division of Information, Office for Emergency Management, New Social Security building, Washington.

—□—

AT EVERY turn the need for greater standardization of materials becomes more apparent. Success of the nation's war program demands that the "specials" be eliminated in every field. Greater ingenuity must be shown in using those things which are available, even if it means a change of pace in the normal functioning of manufacturing practices.

—□—

THE 1941 convention of the A. F. A. in New York was quite successful in every way. The attendance probably exceeded expectations, especially at this time when most foundries are operating at full capacity on defense work. I gained the impression that the representation from the West, Central West and South was extensive.

Special mention should be made of the excellent entertainment features provided by the New York Convention committees selected from the Metropolitan chapter and the various cooperating foundry organizations in the East.

—□—

ONE of the important functions of the annual A. F. A. convention and the regular chapter meetings was emphasized in the following paragraph of President Shannon's address at New York:

> An intangible benefit of our association is the golden opportunity it affords for our forming lasting friendships with men of mutual interests. That such friendships have been formed and continue to develop each year is clearly evidenced at our annual conventions. To me it is a real treat just to watch the greetings, reunions, introductions, and good fellowship so definitely a part of these meetings. I am remembering the old timers, some retired, some infirm, who refuse to abandon the happy spirit of our association and come back to our conventions year after year. We each have something to give the other and grow bigger ourselves, while building our industry and association through love and co-operation rather than competition.

Our sentiments exactly, Leek.

F. G. S.

STEADY *Improvement* IS THE ORDER OF THE DAY

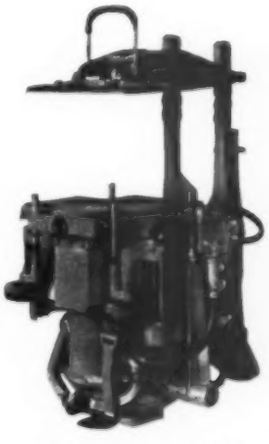
Left foot, right foot . . .
we're in the army now

In the army, every evolution must be executed just a bit better today than yesterday. Tomorrow it must be a little snappier still. That's the inflexible demand of army routine. . . Every manufacturer faces a like obligation. Month by month, *his product and service must be raised to a higher level.* Otherwise, Industry can do without him.

Right now, the SPO line is being subjected to a most severe scrutiny. Every point in every SPO Molding Machine must pass muster, or out it goes. No new feature can gain admission unless it proves itself. That means showing you the way to better castings at a lower cost.

Probably you need less time nowadays for lining up business. Fine—you have more time, then, "for something else". You can put it to no worthier purpose than the *steady improvement of your product and your service.* Thus you and some other 4,000 other foundrymen can contribute your share toward raising the sum total of American efficiency.

. . SPO sales engineers can assist you to that end. Their counsel will be definite, stemming from many years' practical experience as foundrymen.



The No. 211-A SPO Jolt Squeeze Strip Machine is fast, accurate, compact. Its large capacity covers a wide range of applications. Its few working parts are well protected against sand abrasion.

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INDUSTRY IS MEETING DEFENSE

(*Concluded from page* 45)

mately 600 attended the dinner over which Lester N. Shannon, president of the association presided. He called upon Thomas J. Kaveny Jr., vice president of the Foundry Equipment Manufacturers' association, who presented in behalf of his group a handsome radio to C. E. Hoyt, retiring executive vice president A. F. A., as a token for the esteem in which he is held.

Main address of the evening was presented by Dr. Allen A. Stockdale, National Association of Manufacturers, New York, who spoke on "What We Are Defending." Entertainment during the dinner was supplied by Doris Reed, soprano; Alfredo Chigi, baritone, and Harry Lefcourt's orchestra. Following the dinner a reception and dance was held under the auspices of the Metropolitan Chapter of the A. F. A., and co-operating associations.

On Monday afternoon, delegates from the 21 A. F. A. chapters met and discussed a wide variety of problems pertaining to the successful operation of association chapters. Those in attendance exchanged experiences on such subjects as duties of the various officers, membership, programs, entertainment, etc., with Herbert S. Simpson, president elect of the A. F. A., presiding. The annual chapter officers dinner was held Monday evening with President Shannon presiding.

A group of foundry instructors from various colleges and universities gathered at Hotel Martinique on Monday evening for an annual dinner meeting and discussion of the relationship between college work and the foundry industry. Fred G. Sefing, International Nickel Co., New York, was chairman. Fulton Holtby, University of Minnesota, Minneapolis, gave a brief resume of a paper prepared in collaboration with H. F. Scobie, also from the university, which described a course in foundry control methods at his school. This is an advanced course of foundry instruction which has led to the increase in enrollment from 10 students in 1936-37 to 80 in 1940-41.

R. F. Harrington, Hunt-Spiller Mfg. Corp., Boston, discussed "The Foundry Industry and the Engineering Graduate." He pointed out that one of the prime requisites for success is the urge or drive to learn everything possible about the work. Also the graduate must possess the ability to get along with others.

About 15 foundry practice and apprentice instructors and guests held a dinner meeting on Tuesday evening at Hotel Martinique. The meeting was presided over by James G. Goldie, Cleveland Trade School, Cleveland, and was the first time that those individuals met by themselves. In other years they joined with instructors in engineering schools. The chairman called on various members present who spoke briefly on the work they are carrying on in their schools.

Consider Metallurgy of GRAY CAST IRON

TECHNIQUE of producing castings for heavy pump casings, cylinder and valve bodies, ranging in section from ⅝ to 4 inches, in which no risers are used, was outlined at the first session on gray iron founding by H. H. Judson, Goulds Pumps Inc., Seneca Falls, N. Y. Chairman of the meeting was W. H. Spencer, Thomas Foundries Inc., Birmingham, Ala.

These castings, used in high-pressure applications, range in weight up to 1½ tons and are tested under water pressures as high as 3500 pounds per square inch. A few are tested with kerosene at 2000 pounds per square inch pressure. Iron is produced by the two-cupola process, and usually ranges in carbon from 2.60 to 3.5 per cent and in silicon from 1.25 to 2.50 per cent. Charge includes a high percentage of steel, occasionally up to 85 per cent.

Principal factors in the operations are: Dry sand molds rammed hard and poured on the hot side; sand mixtures open and venting freely; use of as deep a cope as is possible ranging from 12 to 40 inches. Permeability of facing and backing sand ranges from 105 to 115. Machinability of castings is checked with chill block tests. Elimination of risers on these castings resulted in no ill effects, according to Mr. Judson. However, he pointed out this practice represented as much nerve as it did good judgment.

Commenting, Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., observed that his company produces castings by a similar process, but pour on the cold side, use desulphurizers and hold the metal in the ladle for 10 minutes before pouring.

An interesting and thorough analysis of the effects of moisture and preheating of the cupola blast on gray cast iron was reported by R. E. Smith, International Nickel Co., Bayonne, N. J. J. T. Eash of the same company collaborated in this work. Iron tested was 1 per cent nickel material, melted in a 41-inch cupola lined to 20 inches. Charges weighed 200 pounds each and included 25 per cent structural steel scrap, 20 per cent pig iron with 2 per cent silicon content, 50 per cent chill cast pig with 1 per cent nickel content, and the balance silvery iron. This gave a charge analysis of 2.45 per cent total carbon, 1.90 silicon, 1.04 manganese, 1.00 nickel, 0.08 sulphur and 0.07 phosphorus. Coke ratio with cold blast was 9 to 1 and with preheat 11 to 1.

Blast Is Preheated

In the hot blast experiments, air was preheated in an oil-fired heater to 900 degrees Fahr. Moisture content was varied between 17 and 385 grains per pound of air. Test bars were poured in dry sand molds, with a complete range of moisture content in the blast, both preheated and cold. Physical and metallographic tests were made to determine the effects.

In general it was shown that with preheated blast a 20 per cent saving in coke was possible, less sulphur pickup noticed, melting rate increased 18 per cent and less metal losses were observed. Increased moisture content in the blast slowed down the melting rate, increased manganese and silicon melting losses and increased carbon pickup. Tensile properties, transverse strengths and impact strengths declined with increasing moisture, while chill depth increased.

Summary of a series of articles on the cupola melting process published in various German technical papers over the past 7 years was presented by S. C. Massari and R. W. Lindsay, Association of Chilled Car Wheels, Chicago. Much of the original articles represented work by H. Jungbluth and co-workers. A mathematical relation between melting rate and blast volume, coke charge and the stage of combustion was established as a result of these investigations, as well as a general hypothesis of the mechanism of melting in the cupola.

Four papers dealing with the effect of temperature on cast iron

(*Continued on page* 100)

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CORE OVENS **COLEMAN** MOLD OVENS

(*Continued from page* 98)
were presented Thursday morning under the joint chairmanship of John W. Bolton, Lunkenheimer Co., Cincinnati, and R. G. McElwee, Vanadium Co. of America, Detroit. The first paper by G. A. Timmons and V. A. Crosby, Climax Molybdenum Co., Detroit, and presented by Mr. Timmons, contained a detailed report of a series of experiments conducted expressly to determine effect of pouring temperature on resulting chemical and physical properties of the iron. In all cases a marked drop in tensile and impact values was noted in iron poured at 2650 degrees Fahr. Maximum physical properties were attained only in iron poured at 2800 degrees Fahr. The speaker claimed that this condition applied to the alloy or so-called high test irons. Ordinary gray cast iron showed little or no variation whether poured at high or low temperatures.

Consider Temperature Effect

S. C. Massari and R. W. Lindsay, Association of Manufacturers of Chilled Car Wheels, Chicago, presented an extensive paper of 32 pages on effect of maximum melting and pouring temperatures upon graphitizing behavior as investigated in an iron containing 3.60 total carbon and 0.55 silicon. Depth of chill increased as the superheating temperature was raised. For a given superheating temperature the depth of chill was decreased and the mottled zone was narrowed by lowering the pouring temperatue. Microstudies and chemical analyses showed that the behavior is due to presence of absence of graphite nuclei in the molten iron which act as seeds for graphite precipitation. Nucleation, by the introduction of an extraneous source of graphite into the molten iron, was studied. Such treatment markedly affects graphitizing behavior, reducing depth of chill and causing a sharp transition from chilled gray iron. Results of the practical application of nucleation in conjunction with the use of a strong carbide stabilizing element were described and discussed by the authors.

Effect of ladle inoculation on the solidification of cast iron was described in a paper by J. T. Eash, International Nickel Co., Bayonne, N. J. In a series of quenching experiments the author determined that gray irons with a fine, dendritic, graphite pattern solidify in the metastable iron-graphite system as white irons and that the eutectic carbide subsequently decomposes in the solid to form iron and graphite. Irons that solidify with a random flake graphite pattern do so in the stable iron-graphite system. Flake graphite forms during the freezing of the graphite-austenite eutectic.

The fourth paper on the program, "Notes on the Undercooling of Gray Cast Iron," was prepared by Alfred Boyles and C. H. Lorig, Battelle Memorial Institute, Columbus, O. Explanation covered experimental methods and apparatus. Each charge of gray iron, pieces weighing about 200 grams cut from standard test bars, was melted in a furnace at a temperature of 2700 degrees Fahr. The authors advance a theory on the reason for the formation of the structures in two irons of the same analysis poured at different temperatures.

"Development and Control of Engineering Gray Cast Iron," by R. A. Flinn, American Brake Shoe & Foundry Co., Mahwah, N. J., and Don J. Reese, International Nickel Co., New York; and "Heat Treatment of Cast Iron," by C. A. Nagler and R. L. Dowdell, University of Minnesota, Minneapolis, were discussed Thursday afternoon at a session presided over by Chairman V. A. Crosby, Climax Molybdenum Co., Detroit, and Co-chairman H. A. Deane, American Brake Shoe & Foundry Co., Mahwah, N. J.

Work Carried on for Years

Purpose of the first paper, as explained by the authors, is to summarize the results of an extended investigation of the properties of gray cast iron, begun at the research laboratory, International Nickel Co., Bayonne, N. J., in 1936 and continued at the Massachusetts Institute of Technology, Cambridge, Mass., as a doctorate research problem. In this paper is is proposed that the properties of any gray cast iron are dependent wholly on the structure. Discussion of this change in properties with structure is divided into two parts: 1—Effect of change in graphite structure and 2—effect of changes in the ferrous background and matrix. Demonstration follows how these changes in structure may be produced and controlled, including the new high strength acicular structures showing tensile strengths up to 165,000 pounds per square inch. Numerous explanations of technical terms and other forms of simplification should be of distinct assistance to the student and not of too great inconvenience to the professional metallurgist.

A paper on heat treatment of cast iron prepared by Charles A. Nagler and Dr. Ralph L. Dowdell, department of metallography, University of Minnesota, presented in considerable detail the methods and apparatus employed in investigation of variations in hardness caused by heat treatment. Attempt was made to correlate the resulting microstructure with the hardness values obtained. Castings were subjected to two types of heat treatment, quenching and tempering and isothermal transformation by quenching in a salt bath at elevated temperatures. Treatment in all cases covered a wide range of temperatures. The authors draw an interesting series of conclusions as a result of an extended set of experiments.

Cupola melting of steel scrap, broadening influence in use of these grades in the production of iron castings and the effect on cupola practice, was the subject of a round table discussion Tuesday evening with Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., presiding. Revolving around a paper on the topic presented by Don J. Reese, International Nickel Co., New York, technical problems arising from scarcity of some desirable grades of steel scrap for the production of low total carbon cast irons, were reviewed, without foundrymen differing greatly as to basic practice.

Most foundries using steel rails do not get enough short lengths and Mr. Reese indicated that with the abandonment of street railway lines on the increase and the employment of heavier rails, the supply will become more limited. He also suggested some foundries tend to use too much steel in the charge, having reversed former practice. By loose use of too much steel, he contends castings may cost from $5 to $10 a ton more than necessary.

Steel Scrap Available

Current shipments of both cast and steel scrap are being accepted by foundrymen who would have rejected such material formerly, and a wider range of steel scrap materials for cupola melting was considered likely, including wire rope, turnings, borings and notably bundles. As to the latter, they tend to be heavier individually.

The type of castings required should fix the grade of steel scrap with variables as to control of carbon with a view of maintaining machinability. Clean uniform No. 1 melting steel gives best results in the production of castings of numerous widths for tractors at one mid-west plant. Briquetting of borings and turnings also is found satisfactory. In the production of castings, one ounce to two tons, for heavy mobile equipment, including tractors, the view that only steel rails can be used was termed a fallacy. Bundled scrap from nearby sources which can be used by a wire mill in open hearth practice also can fill cupola requirements, it was suggested.

With 60 to 70 per cent of tractors made up of cast iron, a large pro-

(*Concluded on page* 103)

(*Concluded from page* 100)

ducer uses 12 per cent pig iron and finds 60 per cent of baled steel scrap, including turnings, desirable. Bundles are usually 18-inch cubes.

Charging of light steel scrap in quantities tends to increase the sulphur content and some foundries are having difficulties in meeting navy specifications as a result. Lighter scrap also requires closer supervision of melting practice. It was suggested steel scrap for cupola melting be classified in heavy and light sections. As to the use of rails, good practice suggests they should be no longer than one-third the diameter of the cupola, the same applying to other pieces for the charge.

Operation of a cupola is as difficult and important as for an open hearth and some foundrymen took the stand it is impossible to substitute supervision in melting for good materials. Slack baling of bundles drew some fire; rubber in automobile scrap and wood with the steel. Dipping of bundles in a lime solution has resulted in a decline in sulphur pick-up with some foundries. It was generally agreed there is a necessity for steady readjustments in foundry practice involving steel scrap in cupolas. Mixing ladles are favorably accepted as equipment while slow-burning coke resulting in lower carbon pick-up has reduced the amount of steel required in the charge.

MALLEABLE CASTINGS Are Used In Defense

GRAPHITIZATION of cementite in cupola white iron was the subject of the first paper at the malleable founding session Monday afternoon. Authors were N. A. Ziegler, W. L. Meinhart and A. J. Deacon, research laboratories, Crane Co., Chicago. Chairman of the meeting was Carl F. Joseph, Saginaw Malleable Iron Division, Saginaw, Mich.

The three authors, with Dr. Ziegler presenting details, made a study of the expansion of white iron during the malleablizing process, by means of a dilatometer, for the purpose of enhancing present basic knowledge with regard to the mechanism of graphitization of white iron. Same iron was used for all experiments, showing 3.16 total carbon, 2.98 combined carbon, 0.91 silicon, 0.47 manganese, 0.092 sulphur and 0.17 per cent phosphorus. Dilatometer experiments were supplemented by microscopic examinations and chemical tests.

Work of previous investigators on initial growth and the temperatures at which it occurs was confirmed, and it was determined that, in these latest experiments at least, only the excess cementite and limited amounts of carbon held in solution by austenite are graphitized during the so-called first stage. The most efficient method of carrying the reduction of pearlite to ferrite and graphite during the second stage of graphitization was held to be the reduction of temperature within the eutectoid range in steps, since no graphitization occurs in that temperature range with reasonably short time periods. The data indicated that by proper adjustment and regulation of the heat treating cycle of cupola white iron a wide range of physical properties is obtainable in the resultant materials.

The question was asked about the effect of titanium on graphitization and it appeared to be agreed upon that even small amounts—0.01 per cent for example—exerted marked effect upon graphitization. Chairman Joseph and others concurred in this viewpoint.

Special Mechanism Needed

Velocity of conversion of austenite to ferrite and cementite was examined in a paper by Dr. H. A. Schwartz, manager of research, and M. K. Barnett, research metallurgist, National Malleable & Steel Castings Co., Cleveland. In their investigation, graphitization was followed quantitatively in specimens cooled at constant rate through the temperature interval when "bulls' eyes" are formed. It was observed that in this interval graphitization may be about ten times as fast as just above and 100 times as fast as just below this point. It appears necessary to assign a special mechanism for the graphitizing process in this temperature zone.

Flame hardening of malleable iron, a relatively new treatment for that product, was discussed by Stephen Smith, Air Reduction Sales Co., New York. He outlined the hardening of black-heart and pearlitic malleables by the oxyacetylene flame, using various types of tips and time-temperature relations. Two general methods were suggested: The application of the flame to the whole surface to be hardened and then quenching; or moving the flame progressively over the surface to be hardened and the surface immediately quenched by a stream of water at the proper distance behind the flame. Oil is of course excluded from the progressive method as a quench because of its flash characteristics.

Flame hardening can be subjected to misapplications, particularly with respect to parts unsuited in shape or section to the process. Wherever possible, parts or sections to be flame hardened should be uniform in thickness. Where hardness in corners or grooves is required generous fillets should be introduced.

Flame Harden Black Heart

Flame hardening of black-heart malleable is more readily controlled by the heating and quenching method than by the progressive method, but the decarburized skin should be removed to obtain best results. Surface hardness of Rockwell C42 to C58 may be obtained, depending upon the nature of the matrix and the structure of the case desired.

Tuesday, under the chairmanship of John Wagner, president, Wagner Malleable Iron Co., Decatur, Ill., two papers were presented dealing with certain phases of the malleable iron industry. The first by James H. Lansing, Malleable Founder's Society, Cleveland, showed how malleable iron castings have been incorporated in the construction of many pieces of equipment entering into the national defense program. A comprehensive series of slides illustrated a long list of castings used in the construction of armored scout cars, midget combat cars, army trucks, tractors, army field ranges, machine gun mountings, supply trucks, airplanes, mortars, and other types of guns. In a typical instance the speaker stated that 315 pounds of malleable iron castings are used in the front driving axle assembly of the armored scout car, and 448 pounds in the rear axle assembly, a total of 763 pounds of malleable castings. A portion of the data presented in this paper was published on page 90 of the May, 1941 issue of THE FOUNDRY.

The second paper "Some Observations in the Duplexing of Malleable Iron," presented by G. A. Schumacher, Albion Malleable Iron Co., Albion, Mich., brought on a lively and extended discussion by many of the experienced and expert malleable iron foundrymen, including James H. Lansing, Malleable Founder's Society, Carl F. Joseph and W. H. Doerfner, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich.; W. R. Bean, Whiting Corp., Harvey, Ill.; Milton Tilley and H. A. Schwartz, National Malleable & Steel Casting Co., Cleveland and D. Tamo, American Chain & Cable Co., York, Pa.

The paper stressed the importance of slag in controlling the composition of the bath and the resulting chemical and physical properties of the metal in the castings. The speaker admitted that the control of slag in the cupola-air furnace duplexing process is not new, but he showed some interesting data developed in the practice at his plant. From a practical standpoint his observations indicate that proper slag manipulation facilitates the control of carbon, silicon and manganese, reduces refractory costs, and produces a metal free from miss runs and tears.

Function of the slag is to act as a collector of inclusions or nonmetallic impurities in the bath, oxides of silicon, manganese and iron, also silicates, manganese, sulphide, etc. The slag also protects the liquid metal from the contaminating influence of the flame and helps to control the reaction rates in the bath, principally oxidation. Concentration of iron oxides in the slag formed in normal air furnace practice is diluted by additions of limestone and silica sand to the bath. Usual amounts of these constituents added per hour are 20 pounds limestone and 60 pounds of sand.

Melting and Handling NONFERROUS ALLOYS

AT A MONDAY session devoted to nonferrous founding and presided over by W. J. Laird, Westinghouse Electric & Mfg. Co., Pittsburgh, with William Romanoff, H. Kramer & Co., Chicago, as co-chairman, a paper on an experiment in efficient crucible melting was presented by G. K. Eggleston, Barnes Mfg. Co., Mansfield, O. The speaker explained that the paper represented a continuation of the work reported at the Cincinnati convention of the A. F. A. under the title "Efficiency in Crucible Melting", and another paper "Recent Developments in Melting Furnaces" presented at the 1940 Lansing, Mich., regional conference of the Detroit Chapter of the A. F. A.

In the present instance the work involved a solution of the problem to get more heat into the metal without passing it over the top of the crucible. This could be done by increasing the temperature of the furnace wall. A furnace was designed to accomplish this result by having the flame exhausted through openings near the top of the silicon carbide lining and carried down outside the lining. The oral description was illustrated by several slides showing sectional views of three varieties of furnace, sealed top, open top and conventional type. Possibilities of the design first were checked in a laboratory size furnace with a metal capacity of 15 pounds. Several changes and modifications were tried before settling on one suitable for commercial practice on a No. 80 pot.

In the second paper J. M. Kelly, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., described the effects of furnace atmospheres in nonferrous melting. The paper covered a study of the effect of furnace gases on the porosity of high conductivity copper castings, also the low physical properties obtained in some instances in these alloys. As a basis for his discussion the author showed the solubility relation as a function of temperature for various gases found in foundry atmospheres and pointed out that of those usually found, oxygen and hydrogen appear to be the two gases which exert most of the effect. Differences of appearance of porosity, due to oxygen and hydrogen were described, also possible methods of elimination. The second section of the paper dealt with methods for controlling the absorption of hydrogen and oxygen in copper, possible sources of hydrogen, effect on the ductility of copper castings and other copper base alloys.

Committees Are Active

At the close of the meeting the chairman read reports of committee chairmen on papers and program, round table conferences, research and recommended practices. He also reported activity on the work of representatives of the association on other committees including fluidity testing, molding sand research, costs, refractories, handbook policy, pure metals in ingot form, copper base alloys, light metals and alloys, nonferrous metals.

Two interesting papers were presented at the nonferrous session held Tuesday morning, with Chairman Joseph Sully, Sully Brass Foundry Ltd., Toronto, and co-chairman Ernest F. Hess, Ohio Injector Co., Wadsworth, O., presiding. First paper on foundry qualities and physical properties of silicon-iron bronzes was prepared by E. G. Jennings and Harold J. Roast, Canadian Bronze Co., Montreal, and presented by Mr. Jennings. In response to an inquiry on the effect of nickel additions, Mr. Jennings said that it made the alloy slightly harder without affecting strength or impact resistance to any appreciable degree. Use of a charcoal cover on silicon bronzes usually leads to difficulties, and should be eliminated.

W. J. Laird, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., said that while he had not had experience in melting silicon bronzes in the induction furnace, he believes the cycle frequency of the electric current has an important effect. Alloys which tend to be drossy can be much worse with high frequency current than with low frequency, such as 60 cycle, and possibly it was due to the high turbulence or agitation caused by the eddy current. Sealing the furnace with a borax or other suitable cover to prevent access of air might be beneficial.

Where a variety of brasses and bronzes in addition to silicon bronzes are produced, a system of control must be established to prevent contamination of one by the other, and every effort must be made to see that different alloys are kept separated, according to Mr. Roast. While many silicon bronze castings are made in green sand containing about 6½ per cent moisture, Mr. Jennings stated that complicated castings or those with heavy sections are made in dry sand molds. One speaker said that silicon bronzes are being used increasingly for bearing purposes, and Mr. Roast said that he would prefer, in such applications, to include addition of about ½ per cent of lead.

Seal Porous Castings

Second paper presented by M. E. Brooks, Dow Chemical Co., Midland, Mich., was prepared in collaboration with A. W. Winston of the same firm and described "Magnesium Alloy Foundry Practice". It was similar to articles by the same authors published in the March and April issues of THE FOUNDRY. In the discussion Dr. N. E. Woldman, Bendix Aviation Co., Bendix, N. J., asked about use of tung oil for sealing porous castings. Mr. Brooks said that procedure was followed in complicated castings which could not be produced as sound castings by known molding methods. The castings still hot are placed in an autoclave and subjected to a vacuum of 28 inches for 10 to 15 minutes to extract air and then hot tung oil, around 210 degrees Fahr., is admitted to the autoclave. The castings are removed, washed with kerosene oil, replaced in the autoclave where they are subjected to the action of hot oil at 475 to 500

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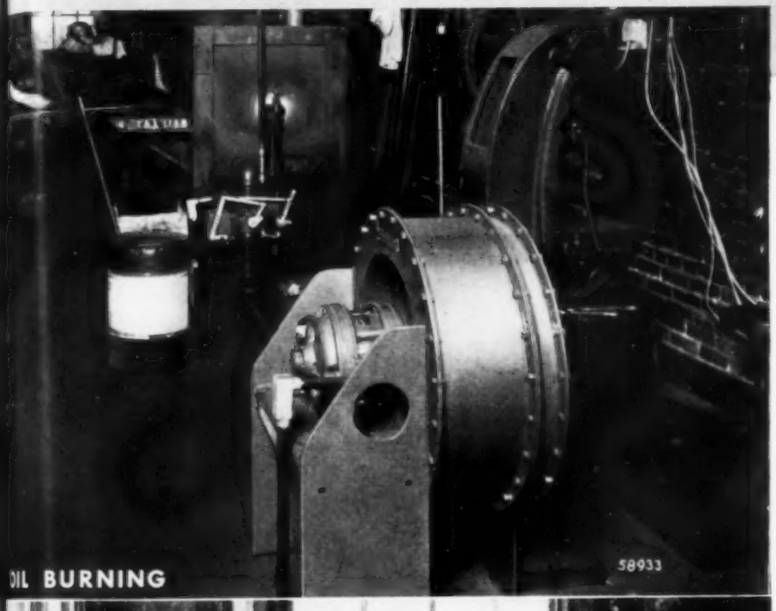

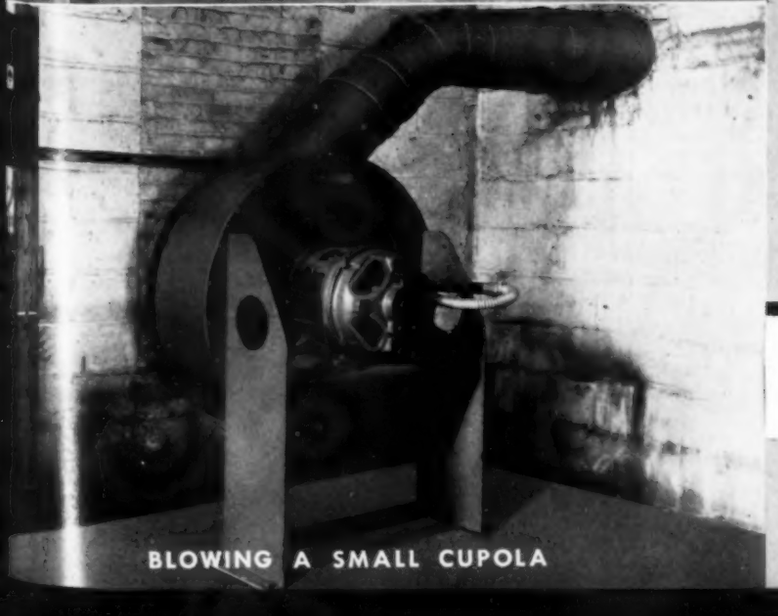

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degrees Fahr., and pressure. The latter polymerizes the tung oil forming a solid which fills the pores in the castings. To prevent polymerization of the tung oil before desired, 2 ounces of hydroquinone per gallon is added to the tung oil which must be pure.

In answer to a question Mr. Brooks stated that a sulphur dioxide atmosphere is desirable in the heat treatment furnace to prevent burning. One of the precautions in melting or handling molten magnesium alloys is to avoid moisture, particularly on tools such as stirrers. The flux used is hygroscopic and picks up moisture from the air. Hence, the tools covered with a film of flux should be dry before inserting in the molten metal. The speaker also said that in his experience most trouble from burns occurs from clothing and not the metal. Therefore, the men are required to wear fireproof woolen shirts, chaps and hoods or masks.

The speaker said, in response to a question, that he did not believe it is necessary to add calcium to magnesium alloys when fluoride inhibitors are employed in the molding sand, but possibly with other inhibitors it served a purpose of preventing burning.

APPRENTICE TRAINING

Greatest Need of Industry

URGENT need for training many of the 4,000,000 additional workers who will be required by defense industries before the end of the year was emphasized by W. F. Patterson, chief of apprenticeship, Division of Labor Standards, Washington. He spoke before the "Apprentice Training" session, presided over by James G. Goldie, Cleveland Trade School, Cleveland. Between one-fourth and one-third of these extra workers must be skilled men, the speaker stated. The proportion ranges up to 65 per cent in the case of construction workers and to 60 per cent for shipyard and foundry employes.

Short-term training programs are necessary to supplement apprentice activities, if the necessary workers are to be supplied quickly, and 90 per cent of this training job must be accomplished by industry, Mr. Patterson continued. However, many of the principles of apprentice training are applicable to the short-term programs.

Pointing out that no compulsion in the setting up of training systems is contemplated, the speaker urged industry to seek the co-operation of the government's field technical advisory service when assistance is required in developing such programs or in improving existing practices. He admitted that army draft has proved a stumbling block in inducing industry to enroll young men for training, and he recommended that management intercede with selective service boards in requesting deferment of men essential to defense work. It was intimated that federal intervention would be forthcoming if relief in this respect is not obtainable from the individual boards in various local centers.

Apprentice training has progressed rapidly the past year, the number of enrolled apprentices in all industries doubling in that period. Mr. Patterson praised the work done by the foundry industry in apprentice training, stating that the American Foundrymen's association's apprentice group has been the most active of any trade association.

A new publication describing opportunities for young men in the foundry industry is being prepared by the association's apprentice committee, it was announced by A. H. Wornom, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

Stress Foundry Training

Best training is afforded workers by including both plant and class room instruction, it was stated by A. L. Armantrout, Carnegie-Illinois Steel Corp., Chicago, in a symposium on "Related Instruction for the Foundry and Pattern Shop Apprentice." Supervision received away from the job can make or break a training program, he stated. Importance of the function of patterns, rather than the method of their manufacture, should be stressed in giving the foundry apprentice related pattern instruction, it was advocated by K. F. Ode, Falk Corp., Milwaukee. He commented that patternmaking should not encroach on other related training of more importance.

Recommended related pattern instruction to be taught the pattern apprentice was listed by Frank C. Cech, Cleveland Trade School, Cleveland as including: Human and industrial relations; pattern shop theory; safety and hygiene; blueprint reading and job planning; related drawing, trade English; trade mathematics and machine shop practice. George Gedeon, Aluminum Co. of America, Cleveland, suggested teaching the pattern apprentice an appreciation of the use to which patterns are put in the foundry, the various types of patterns used and varieties of molding machines employed. He advocated close co-operation between the molding and patternmaking departments in apprentice training.

Winners of the American Foundrymen's association annual apprentice contest in the making of castings and patterns were announced as follows:

GRAY IRON: Henry L. White, Brown & Sharpe Mfg. Co., Providence, R. I.; Chester Blacksmith, Bowler Foundry Co., Cleveland; Burton Bevis, Caterpillar Tractor Co., Peoria, Ill.

STEEL: Bob Bina, Crucible Steel Casting Co., Cleveland; H. Novak, Maynard Electric Steel Casting Co., Milwaukee; Pierre McMullen, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

NONFERROUS: Tony Inancich, Standard Brass Works, Milwaukee; John Jasso, Wellman Bronze & Aluminum Co., Cleveland; Kenneth Zinda, Allis-Chalmers Mfg. Co., Milwaukee.

PATTERNMAKING: John Burcsky, Master Pattern Co., Cleveland; Arthur Sirevoog, Miehle Printing Press Mfg. Co., Chicago; Albert Jazbinski, Western Pattern Works, Cleveland.

Need Skilled Men

The extreme urgency for training skilled men was emphasized by Glenn Gardiner, who asserted that this year had to see an increase of 4,000,000 men on defense jobs and that 38 per cent of these had to be highly skilled. To give the precise impression of what he meant by skilled, he said that the degree of skill required was comparable to that possessed by only 20 per cent of the employes of the automobile industry, an industry generally accepted as having more than the average share of finished craftsmen.

Mr. Gardiner, New Jersey district director, training within industry division, Office of Production Management, and an executive of the Forstman Woolen Co., Passaic, N. J., and Elliot Service Co., New York, spoke at the session on foreman training. An unscheduled speaker was Alonzo Flack, Emerson Engineers, New York, who discussed various phases of the subject. W. E. George, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., was chairman.

Stressing the need for greater industrial manpower, Mr. Gardiner pointed out that 42 billion dollars had now been appropriated for de-

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fense work and that this program alone (additional heavy expenditures are soon scheduled to be appropriated) calls for 16 million man years of work, against less than 9 million for even the most prosperous peace-time year to date. He also declared that men now would have to be trained for certain crafts that had never before existed.

The problem of meeting sharp expanding employment needs, he said, would have to be met largely by the further subcontracting of work and the speedy training of new men for specific jobs. He said that OPM has just decided on a policy of inserting clauses in contracts with prime contractors specifying that a certain amount of work will have to be sublet. What this percentage is going to be has not yet been decided. In fact, he thought there would probably be no fixed over-all percentage, but that the amount to be sublet would be decided upon in connection with the placing of each contract.

As the quickest approach to their training problems under present conditions, Mr. Gardiner suggested that companies communicate with the OPM training directors of their respective districts. Each director, he explained, was assisted by an advisory committee, comprising two representatives of management and two of labor, and by a panel consultants (21 in the New Jersey district).

He urged all companies to continue with such apprenticeship training programs as they may have, but to nevertheless concentrate on the development of men for specific jobs, a training that could be accomplished within a relatively short time. Mr. Gardiner thought that vocational training schools could not supply more than 5 per cent of the trained men required, and stressed the need of developing men on the job, so that they could be working while learning. He said the burden of emergency training would fall on the plant foreman, and that it was up to management to give the foreman every possible co-operation.

He warned companies against attracting men from each other. It did not add one whit to the total supply of labor, but only boosted wage scales and complicated managerial and production problems. He pointed out that Canada has already passed a labor poaching law, and said that such a law here was possible should the practice become more widespread. The speaker also pointed out that labor priorities already are being discussed in Washington as a measure to be taken should present efforts to develop manpower fail.

Mr. Flack referred to the foreman as the link between workmen and management, and outlined what management should do in his development—what it should do in the case of the new foreman, the young foreman with some experience behind him, and the old foreman. He stressed particularly the importance of a sense of fairness in the foreman, as fairness not only builds morale in an organization, but pays dividends in the matter of suggestions by workmen.

Suggests Program for SAFETY AND HYGIENE

FOUNDRY safety and hygiene was discussed from several different viewpoints at a meeting held Tuesday afternoon with E. H. Ballard, General Electric Co., West Lynn, Mass., as chairman. First speaker on the program, Dr. D. E. Cummings, University of Colorado, Denver, described his conception of a suggested code of good practice for the medical control of foundry workers' health. He stated that it should be paid for entirely by management, and that the first requisite is the employment of a splendid physician well trained in the principles of disease prevention.

Duties of such a physician include examining of all applicants for jobs, fitting them to jobs according to their physical conditions, examining old employes for occupational diseases, and recommending corrective changes in working conditions and in jobs so that improved health conditions result. Relationship between the plant physician and the employe should be confidential as in the case of the private doctor as far as nonoccupational diseases are concerned; suggesting medical treatment necessary, and seeing that the advice is followed.

With occupational diseases management should be informed, but not in such a manner that it results in immediate discharge of the employe—rather his services are retained through change of occupation. One procedure is to discuss the case with management without giving the name of the individual, suggesting the required corrective measures, and the other is to name the individual without giving the medical facts.

Roger Williams, State Insurance Fund of New York, discussed progress of industry through co-operation. He pointed out that insurance rates for industrial compensation in New York state were quite high some years ago, but have been reduced considerably through co-operation of various groups. He said that the influx of workers participating in the national defense program is leading to a higher accident rate and that every effort should be given to maintaining it as low as possible. Mr. Williams indicated that 80 per cent of the industrial accidents are due to handling materials, falling objects and handling tools, and that the bulk of them are to eyes, hands and feet.

Executive leadership is necessary to insure good safety and health records since they depend upon the full co-operation of every individual in a plant. Better results may be obtained in accident prevention by increasing the frequency of inspection, by immediate and thorough investigation of accidents with suggestions on remedial measures, and by following through to see that the remedies are used. Safety education is important but discipline relative to safety must be enforced to secure results.

James R. Allan, International Harvester Co., Chicago, and chairman of the A.F.A. committee on accident prevention and hygiene, presented a brief report of that group mentioning the activities in connection with the preparation of foundry industrial codes in the states of New York and Illinois. The Illinois code will be in effect in June 1941, but that of New York still is undergoing changes. He pointed out that at present the A.F.A. has prepared five codes pertaining to safety and hygiene in the foundry, and that others are in preparation.

In the discussion Eliot Armstrong, Inter-Allied Foundries, Buffalo, stated that the proposed New York code contained a provision for the compulsory use of safety devices supplied by the employer to the employe. Inquiry as to penalty elicited the response that while there was no direct statement on that point, it gave the state inspector authority to tag the employe as he would an unsafe machine which presumably would lead to the elimination of the accident prone type of worker.

In response to an inquiry of Arthur Grede, Grede Foundries, Milwaukee, as to the efficacy of a protective shield covering the instep in preventing foot accidents,

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a statement was made that it worked very well. A. C. Denison, Fulton Foundry Co., Cleveland, stated he found that a specially designed goggle which held it farther away from the face eliminated objections of the employes to wearing safety equipment of this character.

Research Reports Given ON STEEL CASTINGS

COMMENCING with a round table luncheon, the steel session on Wednesday continued through the afternoon under the chairmanship of R. S. Munson, Atlantic Steel Castings Co., Chester, Pa., and co-chairman A. H. Jamieson, Malleable Iron Fittings Co., Branford, Conn. The first paper "Converter Developments," by A. W. Gregg, Whiting Corp., Harvey, Ill., and F. B. Skeates, Link-Belt Co., Chicago, was presented by Mr. Gregg. His collaborator is Colonel, 124th Artillery, 33rd Division, U. S. Army, and at present is on active duty at one of the training camps. In his preliminary remarks Mr. Gregg pointed to the rather remarkable fact that the converter as a steel making unit which has played such a vital part in the development of the small and medium size steel castings industry should have been discarded some 25 years ago and today is attracting an unusual amount of interest.

Converter Coming Back

In the speaker's opinion the principal factors contributing to this interest may be listed as follows: Improvement in desulphurizing methods, with consequent improvement in quality and reduction in cost; development of the electric eye equipment for control of the converter operation; flexibility of the converter operation; necessity for a continuous supply of molten metal where continuous molding, pouring and cleaning methods are employed; and improved refractories. Each of these points was elaborated to a considerable extent. Development of the continuous supply of metal involves the use of a triplexing melting method employing cupola, converter and electric furnace. Metal is melted in the cupola, desulphurized blown in the converter and tapped at an approximate temperature of 3200 degrees Fahr. It is then transferred to the electric furnace, which serves merely as a heated distributing unit or ladle. This combination, he claimed, bids fair to revolutionize older methods of producing steel castings. He also referred briefly to a newly developed process for dephosphorizing metal in the ladle.

In a second paper presented by S. W. Brinson, master molder, Norfolk Navy Yard, Portsmouth, Va., the use of models in improving steel casting practice was described in text and illustration. Where only a single casting is involved the cost of the model may approximate 2 per cent of the total cost of the job. Obviously if the number of castings is increased the prorata cost of the model is reduced. However, one of the principal advantages of the model method is that it is cheaper to make a model than to make several castings before hitting on the proper details of construction of the pattern and mold.

Another of the several valuable researches contributed to foundry technology by C. E. Sims, Battelle Memorial Institute, Columbus, O., was presented at the technical session on steel founding Thursday morning, on the subject of pinhole porosity and particularly the mechanism of pinhole formation in steel castings. Co-operating with Mr. Sims in the study was C. A. Zapffe, also of Battelle, Chairman was John Howe Hall, Philadelphia.

Hydrogen Produces Pinholes

Essentially what Mr. Sims sought to establish as a result of extensive tests was that the causes of pinhole formation are related chiefly to hydrogen. Holding to the theory that porosity is caused by gas precipitated from the steel, Mr. Sims explained why the carbon-iron oxide reaction as the basis for a theory is not tenable and why the hydrogen—FeO reaction affords logical explanation for the formation of pinholes.

Mr. Sims reviewed the work of earlier investigators and cited plausible reasons why it is not logical to assume, as some of them do, that pinholes result from nitrogen or carbon monoxide, but may more likely be reasoned to develop from hydrogen evolved from dissociation of water vapor, this hydrogen being absorbed to a not inconsiderable extent in the molten steel and subsequently forming a bubble or pinhole as the metal solidifies by virtue of the reaction between iron oxide and atomic hydrogen. After their inception these pinholes grow by hydrogen precipitating from solution. Mold gases, principally water vapor, of course, furnish the excess of hydrogen that starts pinhole formation.

The authors point out that when aluminum in sufficient quantity to leave a small residual content of the free metal, is added to a silicon-killed steel, the FeO content is lowered to such an extent that even the influx of hydrogen from moist sand cannot raise the concentration high enough to cause a reaction to produce water vapor. Under this condition, no pinholes are formed, although the hydrogen content actually may be higher.

The question was asked that if aluminum is to be considered as the corrective for pinholes, what else besides aluminum can be used in the current emergency when supplies of aluminum appear scanty. Mr. Sims replied that a detailed examination of the aluminum situation revealed that aluminum will continue to be available to foundrymen, though perhaps secondary instead of virgin.

Authorities Do Not Agree

F. A. Melmoth, vice president, Detroit Steel Casting Co., Detroit, commended Mr. Sims for his many valuable contributions to the theoretical phases of foundry practice which have proved to be readily adaptable to practical purposes. The latest study he mentioned as just another example of such a research. Others have included studies on the necessity of the boil in steel melting, need for dry ladles, influence of permeability of facing and backing sands.

Mr. Melmoth called attention to the possibility that concentration of heat in the sand at radii in castings might interfere with the Sims theory of solidification in that the outer film may not form at the same rate as at other portions of the casting. This belief was concurred in by H. F. Taylor, associate metallurgist, U. S. Naval Research Laboratory, Washington.

Report of the A.F.A. committee on radiography of the steel division was presented by G. F. Landgraf, S. Obermayer Co., Pittsburgh. He analyzed and summarized replies to a questionnaire mailed to 190 steel foundries, 79 replies being received, on the matter of the use of radiography. Questions asked were similar to those contained in a questionnaire mailed to a list of foundries in 1938. Comparisons between replies received then and at the present supply ample evidence of the growing importance of x-ray and gamma-ray testing of castings. Another survey of the industry is being considered three or five years hence.

There appeared to be no unanimity of replies to the 1941 questionnaire as far as the use of radio-

graphic testing or the production of castings to radiographic standards were concerned. It was pointed out in discussion of the report that new navy standards for radiographic testing can be expected in the next month, that steel castings will be classified into five types, with three of them calling for various degrees of either x-ray or gamma-ray testing.

Committee on impact testing, newly organized since the last A.F.A. convention, reported through Mr. Taylor who read the report in absence of L. C. Wilson, Reading Steel Casting division of the American Chain & Cable Co., Reading, Pa., chairman of the committee. The group stated there was little of importance to bring to the attention of the association in impact testing, but outlined a number of recommendations made by the navy department for specimens to be impact tested.

Probably the most comprehensive and voluminous paper of the entire 1941 convention was that presented by H. F. Taylor and E. A. Rominski, Naval Research Laboratory, Anacostia Station, Washington, at the session of steel foundry practice Thursday afternoon, with F. A. Melmoth, vice president, Detroit Steel Casting Co., in the chair.

Favor Spiral Fluidity Test

These two energetic investigators presented studies on the fluidity of cast steel as measured by various types of test pieces, including the spiral fluidity mold, which was found to give the most accurate and dependable results. Testing procedure was outlined whereby it is possible to use spiral fluidity mold effectively at the furnace for determining proper tapping times.

Preparation of the test mold, that is, whether it is made of cement sand or green or dried sand, has no influence on the fluidity of cast steel as measured by the spiral test. Mold washes decrease the length of spiral slightly but give better reproduction of the mold cavity. Temperature is a highly important factor in governing the flowing power of steel and its relationship to fluidity was demonstrated for many conditions. Carbon content affects fluidity in only minor degree.

Effect of deoxidation, as governed by the amount of deoxidizer added, indicates that a certain critical amount of oxide is necessary for maximum fluidity. Basic influence upon fluidity of elements, added for alloying effect, is shown to be a function of the individual element and follows no predictable rule. Within the limits of the authors' experiments, molybdenum, vanadium and chromium decreased somewhat the running quality of the steels to which they were added, while copper and nickel increased it. From the results of hundreds of tests, it was possible to postulate an optimum steel analysis for maximum flowability characteristics. This analysis was determined to be: 0.18 per cent carbon, 0.92 manganese, 1.29 silicon and 3.49 nickel.

C. E. Sims of Battelle Memorial Institute, Columbus, O., congratulated the authors upon the thoroughness and completeness of their test results. He suggested that some of the curves purporting to show the effect of certain elements upon fluidity might have to be represented three-dimensionally, to avoid overlooking the dual effects of certain alloys.

Mr. Taylor observed that while much research had been involved in his project, still it was designed to generalize and reduce observations to their most practical terms. Eventually it may be possible to include or initiate new studies on the effects of deoxidizers such as titanium, aluminum, zirconium and others. With 60 illustrations and charts the paper represented an unbelievable amount of routine and study, as well as an important contribution to the foundry technology.

Concluding the week's activities in the steel division was the brief report of the committee on methods of producing steel for various classes of castings.

Cost Session Features
DAILY CONTROL REPORTS

DAILY expense control reports permit excessive expenditures to be corrected more promptly and at lower cost than do weekly or monthly reports. This has been the experience of Oliver Farm Equipment Co., South Bend, Ind., according to E. C. Bumke, superintendent, malleable division, who discussed "Daily Expense Control and a Variable Foundry Budget."

In the daily expense control plan of the Oliver company each department is assigned a number which is used as a prefix. Each account to be kept separate also is assigned a number, and the account number then is used as a suffix to the departmental number. All material requisitions, as well as labor, are charged to the proper departmental charge number. Departmental numbers have been assigned in the sequence of normal production, that is, from core room on through molding, hard cleaning, annealing and finishing.

Keep Separate Accounts

Building repairs are kept separate from regular accounts and are made cumulative for one year, from one month to another. Major maintenance is planned over a 5-year period, repairs proceeding at the rate of 20 per cent of the total per year. An allowance also is budgeted for general motor maintenance, with an accumulating fund taking care of large repairs, such as rewinding.

Labor is separated into four classes as follows, and each has a distinctive labor card: Productive labor; expense labor performed by a producer, usually an added labor expense not originally anticipated when estimating costs; expense labor performed by a nonproducer; overtime earnings.

Each class of labor is recorded on a specific type of time card and after all the cards have been rated, extended and checked, they are added for total hours and money by the department doing the work. Department totals then are added for total payroll of hourly and piece workers for the day, and this figure is used as a check against the total payroll distribution by accounts. An expense labor card also is made out to include total salaries to be charged to a particular account.

Basis for Computing Budget

In setting up a budget it is imperative that some experience be available as to how much money is absolutely necessary for each account. The basis of computing the budget varies with different departments. In the melting department it is computed on tons of iron melted; in the molding department on tons of good castings; in the core room on amount of core sand used; in the hard cleaning room on all castings made, good and bad; and in the annealing room on castings packed each day.

Although pointing out it is inadvisable to set up a budget impossible to attain, Mr. Bumke said it was advisable to shade all allowances a trifle. The Oliver company budgets are established on 90 per cent of actual past performances, and eventually almost every account has reached 100 per cent, due to the foreman's ingenuity in finding short cuts. During the more than 2 years the budget has been

(*Concluded on page* 114)

A COMPACT ROTO·CLONE *System* for a compact sandhandling job

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ROTO·CLONE *DUST CONTROL SYSTEMS*

(*Concluded from page* 112)
used, the company has decreased its controllable expenses about 5 per cent despite increases in both labor rates and material prices.

In later discussion some speakers pointed out the difficulty of budgeting, particularly in basing melting costs on weight rather than on direct labor charges, when there is a wide variation in size of castings produced.

SAND SHOP COURSE

Probes Control Problems

THAT a considerable reduction in nonferrous foundry production costs can be effected by proper sand control was emphasized Monday morning at a session presided over by D. Frank O'Conner, Walworth Co., Boston. One instance was cited of a reduction in cost of 50 per cent by a change in sand control practice.

Harry St. John, Crane Co., Chicago, in leading the discussion, pointed out that natural, synthetic and blended sands all have a place in present-day practice. He outlined briefly developments over recent years, and speaking before more than 100, he commented on the much livelier interest now manifested by nonferrous foundrymen in the subject than 10 years ago, when attendance at sand control sessions did not average more than 10, with only six attending one session.

Moisture Controlled by Hand

Mr. St. John directed attention to sand conditioning systems, declaring they were not as common among nonferrous plants as in certain other branches of the foundry industry. He said that such systems complicated sand control in some respects, usually presenting special difficulties upon first being installed, but that their over-all value was being given greater recognition.

Moisture, it was revealed, still is controlled largely by hand rather than by automatic means. Moisture testers and water regulators were mentioned, but their applications, while valuable, still are limited. Discussing sands used in aluminum casting, one speaker said that from his observation in a plant making airplane parts dry sand was used extensively. He thought the use of green sand in all probability was dwindling considerably for such applications. Mulling was described as particularly desirable in the preparation of blended sands and synthetic sands. Discussing pinholes, one speaker suggested that the best method of combating the problem was through keeping the pouring temperature down.

Question as to the use of oil in keeping sand from drying out revealed that some attempts have been made by using No. 2 fuel oil and fuel oil emulsions, but that these measures have not as yet provided the answer. Consensus was that the solution was still a long way off. Incidentally, it was suggested that good results were obtained by keeping the sand covered.

Approximately 60 were in attendance at the Tuesday morning shop course on sand control in malleable foundries, with J. H. Lansing of the Malleable Founders Society, Cleveland, in the chair and D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn., leading the discussion. In opening the session, Mr. Sawtelle threw out a number of questions for examination, such as how many moisture tests to make each day, how many tests on permeability, procedure in making screen tests and the general interpretation of test data.

It was suggested that one of the principal values of sand testing was the psychological effect on mixers and cutters. The suggestion was advanced that moisture testing be done at night by the man who mixes and cuts the sand. On permeability testing, the comment was voiced that six tests per day might be feasible, these to be done by the operator who prepares facings.

Discuss Different Tests

Green strength tests were said to show trends in sand properties and to reveal evidences of deterioration. Screen tests were considered valuable as a positive demonstration of what the foundrymen has bought and they were recommended to be made on every shipment of sand. Clay tests, despite inaccuracies often involved, were thought to be advisable on occasion. Different sands wash differently and clay tests give additional information which is worthwhile.

In a discussion of synthetic sands, the previous comment having pertained largely to natural sands, the question was asked how to prevent their too rapid drying out. One foundryman said his practice was to add ½ pint of fuel oil to each mixer load of sand or to about 2700 pounds. Addition of clays to natural sands was mentioned.

George Brewer, Taggart & Co., Philadelphia, occupied the chair at the Wednesday shop course session where Harry Dietert, H. W. Dietert Co., Detroit, led a general discussion on several ramifications of the perennial subject of molding sand in the foundry. In setting down formulas he explained that they were applicable only under certain conditions. Presence of one of the long lists of variable factors, easily might change the results of any computation. For example in the matter of permeability and venting of a mold he showed that a formula applicable to a shallow cope would not apply or would not show the same result as the same formula applied to a deep cope. Density of ramming, as might be expected, also influenced the result. A certain amount of practical foundry knowledge is essential on the part of any person dealing with any phase of the sand situation.

Fines and Silt Differ

On the subject of fines he first explained the method for testing sand to determine the clay content and then pointed out that a danger exists of confusing clay, that is the colloidal material, with silt. Although clay and fines are regarded as undesirable elements, recognition must be given to the fact that a definite proportion of each is necessary for a proper functioning of the sand as a molding material. These factors affect the strength and permeability of the sand and also the surface appearance of the casting. Other features discussed included the advantages and disadvantages of sea coal additions, and the effects of oxides present in the sand.

Steel sand shop practice was discussed at the final session, with D. L. Parker, General Electric Co., Everett, Mass., presiding as chairman, and W. G. Reichert, American Brake Shoe & Foundry Co., Mahwah, N. J., leading the discussion. Particular interest centered in sand reclamation, with Mr. Reichert declaring that very satisfactory results in the production of steel castings can be obtained by using reclaimed sand, provided it was properly treated. He pointed out there were two general methods for treating, the dry and the wet methods.

He emphasized the importance of proper equipment and proper supervision. The speaker said that decision as to materials to be added to the sand mixture should be made by a man of experience and by one who has full authority to make the decision. He remarked also that from his observation reclaimed sand

(*Concluded on page* 116)

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for steel castings requires ½ of one per cent of bond, adding that less bond is required for roughened grained sand than for the smooth grained material.

Cooling of reclaimed sand, a matter of increasing importance in view of present high operations at most plants, can be done satisfactorily by wetting the sand and then pulling an exhaust through it, Mr. Reichert said. He also pointed out that in car wheel foundries reciprocating conveyors are used effectively for cooling sand. He added, of course, that ample storage facilities solved the problem, if they were available.

Mr. Reichert presented lantern slides showing some adverse effects of improper sand control. Discussing grain structure, he said that subangular grained sand, in his opinion, is now in greater favor than the rounded grained sand, which had been popular for many years. Relative to clays, he said it was important to know the various properties and to be able to select the clays for their proper uses under varying conditions.

Report Progress in SAND RESEARCH WORK

AN EXTENDED meeting Tuesday afternoon devoted to a consideration of several phases of steel foundry sand research, was presided over by Chairman J. B. Caine, Sawbrook Steel Castings Co., Lockland, O., and co-chairman D. L. Parker, General Electric Co., Everett, Mass. J. R. Young, Cornell University, Ithaca, N. Y., presented a progress report on investigation of high temperature properties of steel sands. G. W. Ehrhart, also of Cornell University, described the results of experiments on measurement of free expansion of sand mixtures at high temperatures. R. E. Morey and H. F. Taylor, Naval Research Laboratory, Anacostia Station, Washington, presented a paper on synthetically bonded steel molding sands. The meeting concluded with a report of the committee on foundry sand research.

Subjects Covered in Brochure

The papers have been incorporated in a 75-page brochure issued by the American Foundrymen's Association. A brief listing of the subjects covered will indicate the scope of the work: Sands selected, screen analyses, tests specified, preparation of specimens, ramming, methods of testing, discussion of results, comparison, high temperature tests, relative behavior, summary of results and conclusions. Subdivisions considered in the second part of the report include mechanical and optical measuring apparatus, calibration of apparatus, mixtures, preparation of specimens, correlative tests, results, comparisons, theory and trial, summary.

Extreme difficulty of the work on account of the many variables involved is indicated by a paragraph in the summary section of the first report "The extent to which the results of the 2 x 2-inch and 1⅛ x 2-inch specimens differ depends a great deal on the sand being tested. For some sands the larger and smaller size specimens give almost identical data. For other mixtures the results obtained are not at all comparable. Extent of difference in results also is affected considerably by a change in the moisture content of any particular sand. Apparently there is no formula for converting results obtained from 1⅛ x 2-inch specimens into figures which would hold true for corresponding 2 x 2-inch specimens. Equally contradictory results were noted in the experiments conducted to determine the expansion and contraction of sand specimens exposed to high temperatures.

Add Clay as Slurry

Clay slurry additions for molding sand rebonding has improved considerably properties at a reduced cost. That has been the experience of the Saginaw Malleable Iron division, General Motors Corp., according to R. H. Mooney, plant engineer, Saginaw, Mich., who presented a paper on the subject at the sand research sessions. The system was designed for continuous use after experience with two trial installations. Tracing history of developments in methods of making rebond additions to continuous molding sand systems and describing equipment and methods now employed in normal application of clay slurry practice, Mr. Mooney outlined improvements attained. Continuous handling of sand to and from sand systems and the mixing of rebond mixtures has been eliminated entirely.

As a result it is now necessary to haul but approximately 13 tons of clay daily to the three systems whereas 90 tons per day were formerly hauled for a 16-hour schedule. In addition all cost of mixture preparation is eliminated. More uniformity in control of moisture content and bond strength of the molding sand is possible. Also, no change in the type of clay has been needed; this being a medium-priced material ground to a fineness whereby approximately 25 per cent is retained on a 100-mesh; 25 per cent on 200-mesh, and 50 per cent will pass through a 200-mesh.

More can be done in connection with the use of various clays or combination of clays with the slurry method of addition to the sand system, in Mr. Mooney's opinion and trial runs will be made with this in view.

Early operating trouble was experienced in the plugging of the slurry line by lumps of foreign material, including coal and stones becoming lodged at bends or the control valve, but this has been eliminated by installation of a screen inside the tank at the clay slurry outlet. Tanks are emptied every three or four weeks for the removal of accumulated foreign material, but are left full over night and week ends. Slurry is discharged into the continuous muller along with the system sand.

Casting Losses Reduced

Development of sand control in the shops of the Griffin Wheel Co., Chicago, was outlined by J. J. Boland of that company. Since 1935 there has been a gradual reduction in loss percentage attributable to molding defects throughout the foundries. Such loss, now approximately ½ of one per cent, is ample evidence sand control has paid dividends. The answer is not always sand when losses or cleaning costs are out of line, but according to Mr. Boland, how the sand is used may have a material influence on effecting economies. He claims a large tonnage of good sand is going into refuse dumps at many foundries and better sands are being scrapped than some of the new sands foundries are using. Better work can be done with controlled sands, but that means recording of findings and continuous study of results over substantial periods. Guess work must be taken out of blending and regulating of sand if advanced methods of molding, manual or mechanical, are to be completely efficient, Mr. Boland claims.

While sand control is a form of mechanical measuring, there are variables depending on individual performing the work and delicate instruments are generally more accurate in laboratories than even in clean foundries. Inferior work blamed on sands, according to Mr. Boland, is due frequently to faulty supervision. Under the best of con-

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ditions foundry sands are only as good as the men who use them. Foundrymen can not afford to sell sand control short because they do not understand the subject.

Reporting on reproducibility of tests of foundry sand, Stanton Walker, Washington, consulting engineer, National Industrial Sand Association, and chairman of the committee on foundry sands, declared the whole question of test procedures needs further study if reasonable uniform results are to be obtained by different laboratories. Dry sand molding procedure for heavy castings was outlined by W. A. Hambley and A. Lebesch, Allis-Chalmers Mfg. Co., Milwaukee. Chairman and co-chairman at this session were W. G. Reichert, American Brake Shoe & Foundry Co., Mahwah, N. J., and R. F. Harrington, Hunt-Spiller Mfg. Co., Boston, men prominent in sand work for many years.

Discuss Three Types of FOUNDRY EQUIPMENT

THREE papers on different phases of plant and plant equipment were presented at a session on that subject held Thursday morning with E. W. Beach, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. as chairman and C. E. Westover, Burnside Steel Foundry Co., Chicago, as co-chairman. First paper by Howard Mason, Symington-Gould Corp., Depew, N. Y., described a system of sand preparation by the wet method in which cores and molding sand sticking to the casting surface was removed and reclaimed hydraulically.

According to Mr. Mason the process possesses numerous advantages including production of castings more uniform in appearance, elimination of surface defects, castings more uniform in dimensions, less dust in the foundry, sounder castings, lower cleaning room costs, decrease in sand waste, almost complete recovery of core rods, chills, nails and other metallic objects, etc. In response to a question on whether a defloculating agent was necessary in the system, Mr. Mason said it was not. He also stated that repair costs were low, and that little trouble was experienced with breakdowns.

Second paper on "Centrifugal Casting and Equipment" was presented by Nathan Janco, Centrifugal Casting Machine Co., Tulsa, Okla. He said that the additional head created by centrifugal force pushed the metal through thinner sections, and promoted feeding. Molds are spun vertically at the rate of about 1000 surface feet per minute. A high yield is obtained, less metal is required in pouring a specific casting as compared to static pouring, and a lower cleaning cost is obtained due to lack of risers.

With green sand molds the cost of molding is about the same as for static molding, but higher for dry sand molds. In the case of large castings the mold is spun at low speed until it is filled with metal, and then the speed is increased immediately to the operating range. That is done to eliminate erosion, scabbing and cutting of the mold. In the discussion a question was asked on the type of sand needed for green molds. Mr. Janco replied that it is not as important as with horizontal practice. The molds are rammed as hard as possible to obtain a hard mold face.

W. E. Wright, Sawbrook Steel Castings Co., Cincinnati, stated that in making steel gear blanks by the vertical centrifugal process in his plant a spinning rate of 600 surface feet per minute was found ample, and that blanks up to 72 inches in diameter and weighing up to 4500 pounds were made. He also said that in the case of larger castings that the mold was filled with molten metal before spinning was begun. Mr. Janco mentioned that in pouring steel in the process that a temperature about 100 degrees lower than for static pouring could be employed. A member of the audience volunteered the information that addition of copper to steel seemed to eliminate trouble from hot tears.

Final paper on the program by F. M. Johnson, Surface Combustion Corp., Toledo, O., described a method of drying air for the cupola through use of a solution of lithium chloride. The process is similar to that contained in an article presented in the September, 1940 issue of THE FOUNDRY. Mr. Johnson pointed out the advantages of being able to maintain uniform conditions in cupola melting.

Win Prizes in A.F.A. Apprentice Contest

APPRENTICES from Cleveland again displayed their ability in bringing home the bacon by taking five prizes out of 12 given by the A.F.A. to indentured apprentices for workmanship, quality, and ingenuity in gray iron, steel and nonferrous molding, and in patternmaking. Judges in the final contest held in New York included: For patternmaking—Harry Rubovitz, Newark Pattern Works, Newark, N. J.; John Sherrer, Mack Mfg. Co., New Brunswick, N. J., and J. H. Jackson, Worthington Pump & Machinery Corp., Harrison, N. J. For nonferrous molding—D. E. Broggi, Neptune Meter Co., Long Island City, N. Y., and John A. Marsh, International Nickel Co., Bayonne, N. J. For steel founding—H. D. Phillips, Lebanon Steel Foundry, Lebanon, Pa.; K. V. Wheeler, American Steel Castings Co., Newark, N. J., and R. S. Munson, Atlantic Steel Castings Co., Chester, Pa. For gray iron founding—W. O. Moyer, Otis Elevator Co., Yonkers, N. Y.; W. E. Day Jr., Mack Mfg. Co., New Brunswick, N. J., and Horace A. Deane, American Brake Shoe & Foundry Co., Mahwah, N. J.

First place in steel founding was awarded to R. Bina, Crucible Steel Castings Co., Cleveland; second place to H. Novak, Maynard Electric Steel Casting Co., Milwaukee, and third place to Pierre McMullen, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

First place in nonferrous molding was given to Tony Ivancich, Standard Brass Works, Milwaukee; second place to John Jasso, Wellman Bronze & Aluminum Foundry Co., Cleveland, and third place to Kenneth Zinda, Allis-Cholmers Mfg. Co., Milwaukee.

First place in gray iron founding was awarded to Henry L. White, Brown & Sharpe Mfg. Co., Providence, R. I.; second place to Chester Blacksmith, Bowler Foundry Co., Cleveland, and third place to B. Bevis, Caterpillar Tractor Co., Peoria, Ill.

First place in patternmaking was awarded to John Burcsky, Master Pattern Co., Cleveland; second place to Arthur Sirevoog, Miehle Printing Press Co., Chicago, and third place to Albert Jazbinski, Western Pattern Co., Cleveland.

Sound Plan Needed
IN JOB RATING WORK

A TUESDAY session was devoted to job evaluation and time study, with F. E. Wartgow, American Steel Foundries, East Chicago, Ind., presiding as chairman. A. L. Kress, National Metal Trades Association, Chicago, spoke on job evaluation, and Phil Carroll Jr., New York, on time study. Both speakers illustrated their remarks with lantern slides.

As a prelude to his discussion of job rating, Mr. Kress said management should be concerned constantly about its salary and wage policy. A fair policy in this regard is one of two prime fundamentals of sound industrial relations, he declared, the other being a competent supervisory force, with a good understanding of human nature.

Underlying a fair compensation policy, he stated, are adoption of a level at least equal to rates paid for comparable work in the company's community; establishment of proper differentials between jobs based on relative skill, experience, responsibility and effort; and rewarding of individuals in similar classifications on the basis of merit.

As a basis for job classifications a sound job rating plan is essential, the purpose of the plan being to analyze factually and compare jobs in a plant in terms of relative skill, and other factors. Mr. Kress mentioned 11 such factors in all, varying in importance: Education, experience, initiative, physical effort, mental or visual attention, responsibility for equipment, responsibility for materials, responsibility for safety of others, responsibility for work of others, working conditions, and hazards.

The ideal job rating plan, he said, serves as a yardstick whereby each job is translated into a common denominator so far as its relative value to the company is concerned. Outlining successive steps in the plan, he itemized (1) rating jobs in each department with the foreman; (2) classifying the men according to duties; (3) reviewing the job ratings for the entire plant with a committee from the top management; (4) preparing a correlation chart showing the existing rate structure; and (5) setting up a wage scale.

Mr. Carroll outlined a system of time study measurements for foundry operation. He said all standards should be based on operations of many workmen if possible, and added that on some particular operations it was necessary sometimes to make studies covering a period of months.

Time studies can be applied to every phase of foundry work, he said, and can be developed satisfactorily for jobbing as well as straight production plants. The function of the time study expert, Mr. Carroll said, is to record all elements entering into the work of any group. Through his lantern slides he presented case studies of various foundry operations, explaining various details. Most foundry operations are variables, with few constants, and he pointed to the importance of keeping the former separated from the latter in arriving at conclusions.

PATTERNMAKER BUILDS
From Ideas of Designer

A FAMILIAR yet important theme—that of co-operation between engineer, patternmaker and foundryman—was forcefully re-emphasized in the Wednesday afternoon session on patternmaking by E. J. Brady, chief engineer, Western Foundry Co., Chicago. Vaughan Reid, City Pattern Works, Detroit, was chairman of the meeting, with Frank C. Cech, Cleveland Trade School, Cleveland, co-chairman.

Mr. Brady held it regrettable that users of castings and buyers of patterns too often let the initial cost of good equipment influence them in buying makeshift and almost unusable patterns. He urged that every foundry place authority in some experienced man to make decisions on the most efficient and economical machines and equipment to be used on new jobs before setting casting prices.

He discussed in detail some of the essentials in production of good patterns and core boxes, including pattern draft, casting shrinkage, gating and risering, core prints, crush strips, ram-up cores, chaplets and materials in general.

Calling the patternmaker a "real creator," Mr. Brady added that he is a "man who takes a piece of blue paper covered with a maze of white lines and, with a block of rough wood or a few pieces of metal, fashions the object of the engineer's mind."

Use of tin forms in molding operations was outlined in a paper prepared by Warren A. Smith, Smith-Richardson Mfg. Co., Chicago. He discussed what these forms are, how

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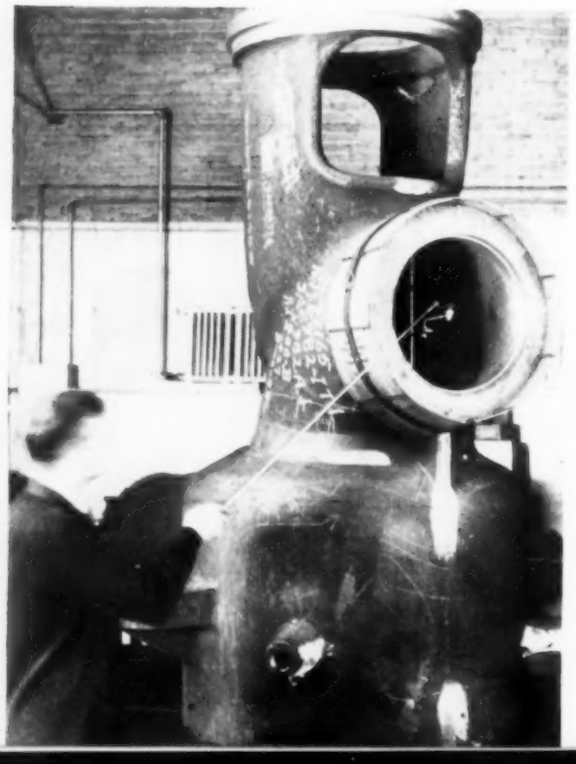

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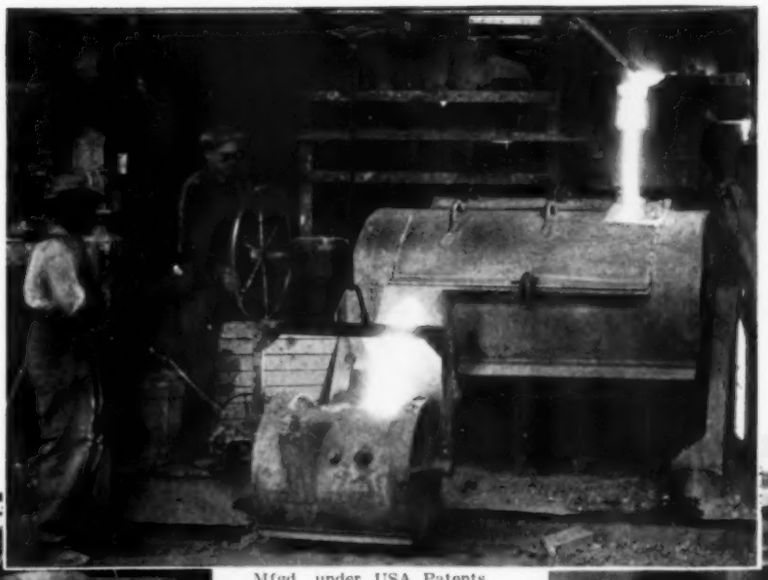

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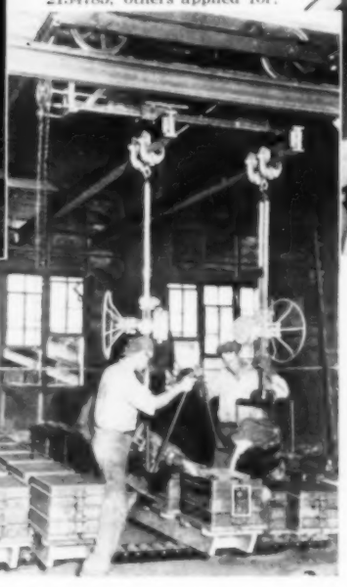

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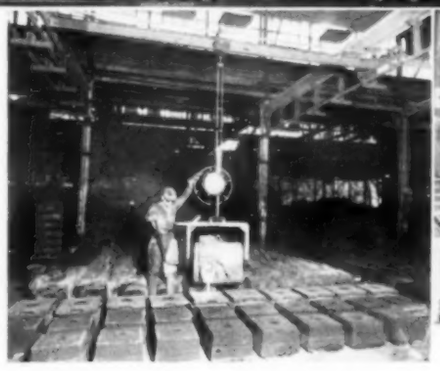

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(*Continued from page* 120)
they are used and what results can be expected from their use. Ordinarily made from tin plate, the forms have several purposes. One is to form parts of a casting which, if made solid on the pattern, would not draw. A box of the required shape is made and hung on the pattern so that it will not move when the sand is being rammed and so that the pattern can be drawn away from it, leaving it in the mold to fill with metal.

Another purpose is to obtain greater accuracy, smoothness of surface, or finer detail than can be obtained from sand at some important part of the casting—square holes in valve handles for example. Tins also are used as a protection on slender cores or on cores having sharp corners.

When the hot metal comes in contact with the tins in the mold, they partially fuse with the metal. As they are in contact with the sand on one side, they do not melt completely, but for all practical purposes become a part of the casting. Ordinarily, a production of several thousand castings is required to justify the expense of a special tin form, but where quantity warrants, they often result in important savings, Mr. Smith concluded.

Study Different Types of FOUNDRY REFRACTORIES

NATURAL firestone as a cupola refractory was reviewed at a Monday morning session by Sidney G. Coon, consulting engineer, New York, with J. A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala., acting as chairman. First examining the geology and geography of firestone deposits, Mr. Coon pointed out that established firestones are of a siliceous nature, with stratified structure, free-splitting qualities which lend a low production cost to the material.

Firestone is employed as a refractory lining in mixers, cupolas, acid tanks, soaking pits, forge furnace bottoms, air furnace bottoms, blast furnace ladles, bessemer converters, crane ladles, copper refining furnace roofs and the like. An important use is that of lining or daily patching in the melting zone of gray iron cupolas, using blocks of the standard 12 x 6 x 6-inch size laid with the grain horizontal in 12-inch lengths. Where thin slabs with horizontal grain are preferred for shorter heats or to avoid a waste of material, they should be sawed on two sides across the grain. Mortar used in joints should not be too high in alumina, with joints about ¼-inch wide at the front or fire face to provide for expansion.

Factors affecting the life of a firestone lining include duration of heat, temperature, ash content of coke, velocity and duration of blast, material charged and nature of the flux. Others are the importance of using seasoned stone, control of lining expansion, and proper installation of the lining. Firestone freshly quarried is relatively soft and continues to harden for at least a year. For all practical purposes seasoning from 30 to 90 days in average summer or fall weather suffices.

In discussion, M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill., acknowledged firestone to be a good refractory material, but its proper use must be learned for successful installations. The matter of drying firestone linings was brought up, one suggestion being to dry new linings for about 5 hours under a low fire and with natural draft.

Refractories in Three Groups

Classifying electric furnace refractories into three groups—roof, sidewall and bottom materials—C. A. Brashares, Harbison-Walker Refractories Co., Pittsburgh, reviewed some of the fundamentals of each classification. Silica brick for roofs represent the most common practice, it was stated, although high heat duty fireclay, superduty fireclay and alumina-silica brick are coming into wider use as conditions warrant. Utility of silica brick for roofs depends primarily upon inherent exceptional strength over the high-temperature range. One of its principal limitations is relative sensitivity to thermal shock, requiring provision for expansion such as insertion of cardboard or wooden strips between the brick which will burn and permit the refractory to expand freely.

Silica brick, superduty fireclay and basic brick comprise the most generally used materials for sidewalls. It is considered best practice, according to the speaker, to confine applications of superduty fireclay to upper sidewalls only and not to extend their use below the slag line. Severity of electric furnace operations is bringing more basic brick into use for sidewalls. Hard burned magnesite and chemically bonded magnesite are both used, as well as brick of the metal encased type.

Acid bottoms generally are of ganister (quartzite) rock installed by tamping or sintering in layers under the heat of the arc. The rock is mixed with fireclay and an organic binder.

Basic bottoms are installed similarly, either pulverized mill cinder or basic slag being used with magnesite. In this connection some interesting work has been done in studying effects of certain slags on sidewall refractories, the work being instituted following observation of the destructive effects of slags on sidewalls at points where brick are not protected against "wild heats." The phenomenon is related to the dusting of dicalcium silicate and was observed particularly after furnace shutdowns extending over a period of 2 days or more.

In one case where burned lime and sand were used for the finishing slag, disintegration of the magnesite sidewall resulted after weekend shutdowns, and was traced to penetration of the refractory by the slag. One corrective is the addition of a stabilizer, such as calcium borate, to the finishing slag during the last four or five heats preceding a shutdown.

Hemisphere Roof Failed

Mr. Brashares cited an interesting trial of an electric furnace roof designed approximately in the form of a hemisphere, an ideal shape from the standpoint of strength, but one which resulted in premature failure because of focal radiation of heat being concentrated between the electrodes.

In answer to a question as to how tightly to lay up metal-cased brick, Mr. Brashares advised that they be laid up loosely even though the metal case provides ample room for expansion of the brick when it fuses. Initial expansion of the brick before the case melts may place undue strains on the brick if laid too tightly.

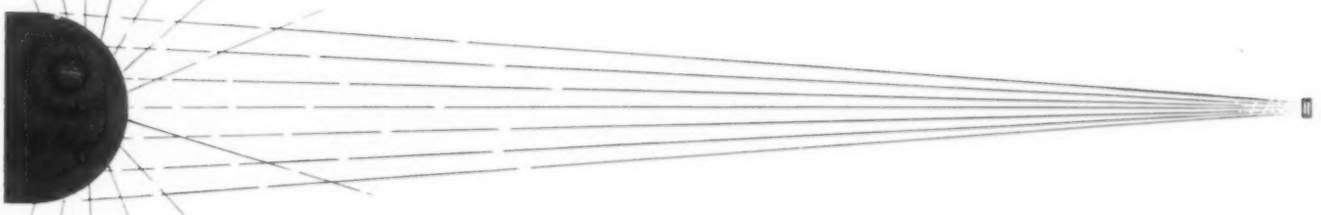
Refractories for air furnaces used in the malleable iron industry were discussed in a paper by J. A. Kayser, Laclede Christy Clay Products Co., St. Louis. He observed that the use of brick bottoms has become general where the iron is melted in cupolas and refined in air furnaces, and is increasing in furnaces used for both melting and refining. Design and construction of bottoms appears to influence bottom life importantly. Better sidewall brick have been produced through improved manufacturing methods, and better jointing materials have prolonged sidewall service. More

(*Concluded on page* 124)

BLAST AND IMPACT CLEANING

Foundry operations that should . . .

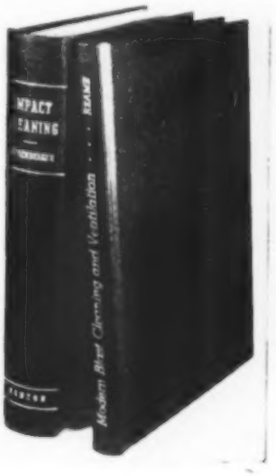
and can be profitmakers!



Too often foundry management looks on blast and impact cleaning operations as necessary evils . . . as unprofitable operations. Properly understood and applied, casting cleaning can be, and in many plants is, a step in casting manufacture that leads to increased profits. For a complete understanding of blast and impact cleaning in actual practice, the two books described below will supply practical, usable information and data. They will be particularly valuable wherever castings, forgings and billets are cleaned. These books are the most complete volumes available on the subject.

"IMPACT CLEANING", by William A. Rosenberger; 480 pages, 256 illustrations, cloth covered board binding; $7 postpaid. The author, a recognized impact-cleaning engineer, has gathered together all important information on the subject and presented it in complete and logical form. Everyone knows that cleaning costs can eat up profits. This book shows both theoretical and practical ways to reduce cleaning costs to a minimum. It presents the "why and how" of high cleaning costs and it shows exactly the methods to be used in their reduction.

"MODERN BLAST CLEANING AND VENTILATION", by C. A. Reams, engineer, Ford Motor Co., 213 pages, 38 illustrations, cloth covered board binding; $4 postpaid. Latest and most approved methods of blast cleaning and ventilation are fully covered from the standpoint of modern practice. This book is chock full of practical suggestions and examples of proven methods and practices in numerous up-to-date foundries. Application of cleaning methods as discussed in this book will help eliminate many objectionable and expensive practices and will increase the number of acceptable castings. Full information is given on selection of abrasives, abrasive cleaning methods, selection of equipment, abrasive reclamation, advantages and limitations, ventilation and reduction of industrial hazards, and scores of other helpful facts. This is a valuable text covering for the first time the entire field of blast cleaning and its allied equipment.



FOR CONVENIENCE USE THE COUPON

THE FOUNDRY, ***Book Department,***
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Enclosed is $ ..... * ☐ Post Office Money Order; ☐ Check; ☐ Company Order; for the book(s) checked below.

☐ **"Impact Cleaning"** @ $7 postpaid.

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NAME: .....

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CITY: ..... STATE: .....

*Orders for delivery in Ohio must be accompanied by 3% additional to cover compulsory state sales tax.

(*Concluded from page* 122)
knowledge has been gained on bung brick failures and improved bung brick have been developed.

Mr. Kayser said that the question of whether an air furnace bottom should be insulated or ventilated is one which needs investigation. Both types are being operated with brick bottoms successfully, but definite data are lacking.

In this connection, W. R. Bean, Whiting Corp., Harvey, Ill., stressed what he considered the advantages of the steel supported or ventilated bottom against the older sand-filled type, the most important being the duplicate results when repaired because of the rigid support. He suggested that the best measure of bottom life is not in terms of hours or tons, since bottoms seldom are renewed completely at one time. The best measure is in terms of brick per ton of iron.

Milton Tilley, National Malleable & Steel Castings Co., Cleveland, reported that 60 per cent Al_2O_3 brick had been found best in his plant in production of 20-30 tons of metal per hour in a furnace operating continuously for 16 hours at 2850 degrees Fahr. J. H. Lansing, Malleable Founders' Society, Cleveland, detailed results of a survey of three plants which averaged 10 brick per ton of iron, including cupolas on duplexing.

Many Problems Studied at GRAY IRON SHOP COURSE

MANY of the almost endless list of items connected with cupola practice were discussed by Don J. Reese, International Nickel Co., New York, at the opening session of the gray iron foundry shop practice course in which the chair was occupied by Norman Wigley, Eaton-Erb Foundry Division, Eaton Mfg. Co., Detroit. While proper, efficient and economical cupola operation is desirable at all times, it is particularly desirable during the present period of tightness of allocation of raw materials in the foundry and all other industries.

Coke Should Be Weighed

Claiming that the fork and measure are not sufficiently accurate, he stated that the coke should be weighed before it enters the cupola. So far as the actual saving in coke is concerned, the amount in many instances is not impressive, but another and more important feature is involved. The character of the coke and amount exert a great deal of influence on the temperature and analysis of the iron leaving the cupola spout and upon the physical properties of the castings.

In addition to the physical characteristics, the size of the individual lumps affect the melting process. For a 36-inch diameter cupola the coke should conform to an average size of 3 inches; for a 48-inch cupola, 4 inches, and in proportion for other cupola sizes. Touching on the subject of low carbon irons, the speaker claimed that the addition of low carbon steel scrap is preferable to comparatively high carbon steel scrap as represented, for example, in steel rails. As with all general rules and statements, certain exceptions were noted. Theory of carbon absorption and method of control were illustrated by a number of slides.

Gating and risering were the subjects of the second meeting of the gray iron foundry shop course on Tuesday afternoon. R. F. Hine, Studebaker Corp., South Bend, Ind., was chairman, and introduced the discussion leader, Elmer J. Carmody, Charles C. Kawin Co., Chicago, who presented an unusually interesting summary of gating and risering techniques currently employed in the industry.

Reduction of scrap by proper use of risers or heads, or by actual elimination of them, was mentioned as a primary consideration. Risers should be close coupled, of proper volume, with high enough temperature to feed and to stay fluid until the casting is "satisfied." One head or riser is usually deemed sufficient.

Types of Risers Employed

High risers are not essential, since they may freeze too fast and draw metal from the casting. Various types of risers described by Mr. Carmody included open type, blind type, top and side type, split core type, etc. An "off sand" or "off metal" condition often can be corrected by a suitable riser, but other factors such as clear metal, clean ladles, proper temperatures and the like, should not be overlooked.

Design is of utmost importance in connection with gating of a casting, but the foundryman often must prove his resourcefulness in determining gating because of inability to change the design of a certain casting. After all, the primary purpose of all gating and risering is the production of a good casting. Hence it is difficult to set down any hard and fast rules about these two factors.

Mr. Carmody showed slides of a number of castings which involved special considerations in gating and risering. He cited some of the advantages of the type of gate which is placed tangent to an indirect head so that a swirling action in the molten metal is obtained when the casting is poured, resulting in cleaner metal. He also urged that risers be designed "on the generous side" so that they will not be arbitrarily condemned simply because of misapplication.

A quick picture of the role of the electric furnace in gray iron founding was presented by A. E. Rhoads, Detroit Electric Furnace division, Kuhlman Electric Co., Bay City, Mich., at the Wednesday afternoon session of the gray iron foundry shop course. Chairman was Kenneth H. Priestley, Eaton-Erb Foundry division, Eaton Mfg. Co., Vassar, Mich.

Advantages of Electric Furnace

Flexibility of electric furnaces, ease of control, high melting temperatures obtainable and ability to be operated intermittently are some of the chief advantages given for that type of equipment as supplemental to regular cupola melting equipment in the gray iron foundry. Referring to direct arc furnaces and to indirect arc rocking furnaces, Mr. Rhoads mentioned three factors as determining their adaptability-availability of low cost power (1-2 cents per kilowatt-hour), extent and nature of scrap for charging, and the nature of the work to be cast. Methods commonly practiced with electric furnaces are straight cold melting, duplexing of cupola iron, and combinations of both of these.

Possibilities of important economies were seen in the practice of one foundry which preheats scrap metal to a bright red (around 1200 degrees Fahr.) before charging into the electric furnace, resulting in saving several hundred kilowatt-hours of power per ton, as well as conserving on electrodes.

The electric furnace can be adapted to both batch and semicontinuous types of melting. With the latter the practice usually consists of tapping the first heat completely and then withdrawing and charging smaller amounts of metal.

Tendency of electric furnace iron to contain more combined carbon than iron of the same analysis made in the cupola was mentioned, resulting in a somewhat harder iron. To meet this condition, silicons are run higher and ladle additions are made. Ideal nature of electrical sheet steel scrap, with silicon content of 4.25 per cent, was cited for use in electric furnace melting.

The fourth gray iron foundry shop

(*Concluded on page* 139)

NEW PRICE SCHEDULE ISSUED FOR IRON AND STEEL SCRAP

A REVISED schedule fixing maximum prices for scrap iron and steel was issued May 6 by Leon Henderson, administrator, Office of Price Administration and Civilian Supply, Washington. The new schedule replaces price schedule No. 4 issued April 3, 1941. The revision was made, according to OPACS, to eliminate inequities inherent in the original schedule, to aid in insuring an even flow of scrap to consumers, and to clarify the original schedule. Many of the changes reflect suggestions from sellers and consumers designed to improve operation of the price control measures.

Among the more important changes are the following:

Classifications are established for several grades of scrap in addition to the 16 grades set up in the original schedule. The new classifications include: Low phos billet and bloom crops; low phos bar crops and smaller; low phos punchings and plate scrap; No. 2 cupola cast; machinery cast, cupola size; clean agricultural cast; No. 1 machinery cast, drop-broken, 150 pounds and under; clean auto cast; punchings and plate scrap; heavy axle and Forge turnings; and medium heavy electric furnace turnings.

Establish Maximum Prices

Maximum prices for nearly all these grades of scrap are established for each of 34 consuming points as against only 13 in the original schedule.

A formula is set up to provide equal access to scrap supplies by consumers located at one of the 34 recognized consuming points and by consumers located outside such consuming points. This formula provides that a consumer located outside such a consuming point may pay as much as $1.00 per gross ton more than a consumer at the nearest consuming point. He may do this if the transportation costs to his plant are no more than $1.00 greater than the transportation costs to the consuming point nearest his plant. This increase of one dollar is permitted only if the consumer has been served from the same source in the past. In no case may the consumer pay a sum in excess of the price established in the schedule at the point from which the scrap is shipped plus the cost of transportation.

Action has been taken to meet complaints of some consumers that they could not obtain scrap from their own areas because consumers in other areas under the original order were permitted to pay higher prices. This problem has been met by basing all maximum prices on all-rail shipments to consumers with the exception that where shipment is by other than all-rail the maximum prices are reduced by the amount that all-rail costs of shipment exceed the costs of any other mode of transportation used.

Provision has been made to aid consumers not located on the line of a railroad to obtain scrap from that road. This has been done by permitting an off-the-line consumer, who has purchased scrap from the railroad in question in the past, to pay the maximum prices established for a consumer on-the-line plus not more than $1.00 to defray the expense of the off-the-line haul. An off-the-line consumer may also pay the maximum price established for the nearest consuming point even if such price is higher than the on-the-line price plus the $1.00 for off-

(*Concluded on page* 127)

Maximum Prices For Iron and Steel Scrap Originating from Railroads

APPENDIX B

Maximum prices given are per gross ton. Scrap Originating From Railroads Operating in a Consuming Point*/ Named Below. (A).—Delivered to a consumer's plant located on the line of the railroad from which the scrap originated—Listed Grades

Grades Consuming Points	No. 1 Railroad Grade Heavy Melting Steel	Scrap Rails	Rerolling Quality Rails	Scrap Rails Three Feet and Under	Scrap Rails Two Feet and Under	Scrap Rails Eighteen Inches and Under
Pittsburgh, Pa.	21.00	22.00	23.50	24.00	24.25	24.50
Wheeling, W. Va.	21.00	22.00	23.50	24.00	24.25	24.75
Steubenville, Ohio	21.00	22.00	23.50	24.00	24.25	24.75
Youngstown, Ohio	21.00	22.00	23.50	24.00	24.25	24.75
Sharon, Pa.	21.00	22.00	23.50	24.00	24.25	24.75
Canton, Ohio	21.00	22.00	23.50	24.00	24.25	24.75
Chicago, Ill.	19.75	20.75	22.25	22.75	23.00	23.50
Kokomo, Ind.	19.75	20.75	22.25	22.75	23.00	23.50
Peoria, Ill.	19.75	20.75	22.25	22.75	23.00	23.50
Philadelphia, Pa.	19.75	20.75	22.25	22.75	23.00	23.50
Wilmington, Del.	19.75	20.75	22.25	22.75	23.00	23.50
Sparrows Point, Md.	19.75	20.75	22.25	22.75	23.00	23.50
Cleveland, Ohio	20.50	21.50	23.00	23.50	23.75	24.25
Buffalo, N. Y.	20.25	21.25	22.75	23.25	23.50	24.00
Portsmouth, Ohio	19.50	20.50	22.00	22.50	22.75	23.25
Middletown, Ohio	19.50	20.50	22.00	22.50	22.75	23.25
Ashland, Ky.	19.50	20.50	22.00	22.50	22.75	23.25
St. Louis, Mo.	18.50	19.50	21.00	21.50	21.75	22.25
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Detroit, Mich.	18.85	19.85	21.35	21.85	22.10	22.60
Duluth, Minn.	19.00	20.00	21.50	22.00	22.25	22.75
Birmingham, Ala.†	18.00	19.00	20.50	21.00	21.25	21.75
Worcester, Mass.	16.50	17.50	19.00	19.50	19.75	20.25
Medford, Mass.			21.00			
Bridgeport, Conn.	16.50	17.50	19.00	19.50	19.75	20.25
Phillipsdale, R. I.	16.50	17.50	19.00	19.50	19.75	20.25
Los Angeles, Calif.	15.50	16.50	18.00	18.50	18.75	19.25
San Francisco, Calif.	15.50	16.50	18.00	18.50	18.75	19.25
Portland, Ore.	15.50	16.50	18.00	18.50	18.75	19.25
Seattle, Wash.	15.50	16.50	18.00	18.50	18.75	19.25

*Where the railroad maker of scrap operates in two or more of the consuming points named above, the highest of the maximum prices set out above for such consuming points shall be the maximum price a consumer's plant at any point on the railroad's line, except:

Where a railroad from which scrap originates operates in two or more consuming points having different switching charges, the price of such railroad scrap:

(1) To a consumer located within a consuming point having the highest switching charge, shall not exceed the maximum on-the-line price established above;

(2) To a consumer located within a consuming point not having the highest switching charge, shall not exceed the maximum on-the-line price established above less the difference between the switching charges at that consuming point and at the consuming point having the highest switching charges;

(3) To a consumer located on the line of the railroad at a point having no switching charges, shall not exceed the maximum on-the-line price established above less the highest switching charge at any consuming point on the line; and

(4) To a consumer located off the line of the railroad, shall not exceed the maximum off-the-line price established below less the highest switching charge at any consuming point on the line.

"The switching charge adjustments above are also applicable to the maximum prices for grades of scrap not listed as provided in paragraph A2 below.

†The prices set forth are for scrap delivered to the Birmingham, Ala. consuming point, excepting scrap for Birmingham consumption originating west of the western boundary of Alabama. In the latter case the Birmingham, Ala., consumer may pay $1.00 more than the prices indicated under "Birmingham."

Maximum Prices for Iron and Steel Scrap Other Than Railroad Scrap

Appendix A

Maximum prices given are per gross ton. Delivered to a Consumer Located Within a Consuming Point [a] Named Below. Prices stated are prices delivered to the consumer's plant

Grades [b] [c]	Consuming Points																
	Pittsburgh	Wheeling, W. Va.	Steubenville, O.	Youngstown, O.	Sharon, Pa.	Canton, O.	Chicago	Kokomo, Ind.	Peoria, Ill.	So. Bethlehem, Pa.	Claymont, Del.	Coatesville, Pa.	Phoenixville, Pa.	Harrisburg, Pa.	Sparrows Point, Md.	Cleveland	Buffalo N. Y.
No. 1 Heavy Melting Steel	20.00	20.00	20.00	20.00	20.00	20.00	18.75	18.75	18.75	18.25	18.75	18.75	18.75	18.75	18.25	19.50	19.25
No. 1 Hydraulic Compressed Black Sheet Scrap	20.00	20.00	20.00	20.00	20.00	20.00	18.75	18.75	18.75	18.25	18.75	18.75	18.75	18.75	18.25	19.50	19.25
No. 2 Heavy Melting Steel	19.00	19.00	19.00	19.00	19.00	19.00	17.75	17.75	17.75	17.25	17.75	17.75	17.75	17.75	17.25	18.50	18.25
Dealers' No. 1 Bundles	19.00	19.00	19.00	19.00	19.00	19.00	17.75	17.75	17.75	17.25	17.75	17.75	17.75	17.75	17.25	18.50	18.25
Dealers' No. 2 Bundles	18.00	18.00	18.00	18.00	18.00	18.00	16.75	16.75	16.75	16.25	16.75	16.75	16.75	16.75	16.25	17.50	17.25
Mixed Borings and Turnings	15.25	15.25	15.25	15.25	15.25	15.25	14.00	14.00	14.00	13.50	14.00	14.00	14.00	14.00	13.50	14.75	14.50
Machine Shop Turnings	15.50	15.50	15.50	15.50	15.50	15.50	14.25	14.25	14.25	13.75	14.25	14.25	14.25	14.25	13.75	15.00	14.75
Shoveling Turnings	16.50	16.50	16.50	16.50	16.50	16.50	15.25	15.25	15.25	14.75	15.25	15.25	15.25	15.25	14.75	16.00	15.75
No. 1 Busheling	19.50	19.50	19.50	19.50	19.50	19.50	18.25	18.25	18.25	17.75	18.25	18.25	18.25	18.25	17.75	19.00	18.75
No. 2 Busheling	15.50	15.50	15.50	15.50	15.50	15.50	14.25	14.25	14.25	13.75	14.25	14.25	14.25	14.25	13.75	15.00	14.75
Cast Iron Borings	15.75	15.75	15.75	15.75	15.75	15.75	14.50	14.50	14.50	14.00	14.50	14.50	14.50	14.50	14.00	15.25	15.00
Uncut Structural & Plate Scrap	19.00	19.00	19.00	19.00	19.00	19.00	17.75	17.75	17.75	17.25	17.75	17.75	17.75	17.75	17.25	18.50	18.25
No. 1 Cupola	21.00	21.00	21.00	21.00	21.00	21.00	20.00	20.00	20.00	22.50	23.00	23.00	23.00	23.00	22.50	22.00	20.00
Heavy Breakable Cast	19.50	19.50	19.50	19.50	19.50	19.50	18.50	18.50	18.50	21.00	21.50	21.50	21.50	21.50	21.00	20.50	18.50
Stove Plate	19.00	19.00	19.00	.....	.....	.....	16.00	16.00	16.00	18.00	18.50	18.50	18.50	18.50	18.00	15.75	19.00
Low Phos. Billet & Bloom Crops	25.00	25.00	25.00	25.00	25.00	25.00	23.75	23.75	23.75	23.25	23.75	23.75	23.75	23.75	23.25	24.50	24.25
Low Phos. Bar Crops & Smaller	23.00	23.00	23.00	23.00	23.00	23.00	21.75	21.75	21.75	21.25	21.75	21.75	21.75	21.75	21.25	22.50	22.25
Low Phos. Punchings & Plate Scrap*	23.00	23.00	23.00	23.00	23.00	23.00	21.75	21.75	21.75	21.25	21.75	21.75	21.75	21.75	21.25	22.50	22.25
No. 2 Cupola	20.00	20.00	20.00	20.00	20.00	20.00	19.00	19.00	19.00	21.50	22.00	22.00	22.00	22.00	21.50	21.00	19.00
Machinery Cast, Cupola Size**	22.00	22.00	22.00	22.00	22.00	22.00	21.00	21.00	21.00	23.50	24.00	24.00	24.00	24.00	23.50	23.00	21.00
No. 1 Mach. Cast, drop broken, 150 lbs. & under	22.50	22.50	22.50	22.50	22.50	22.50	21.50	21.50	21.50	24.00	24.50	24.50	24.50	24.50	24.00	23.50	21.50
Clean Auto Cast	22.50	22.50	22.50	22.50	22.50	22.50	21.50	21.50	21.50	24.00	24.50	24.50	24.50	24.50	24.00	23.50	21.50
Punchings & Plate Scrap***	22.00	22.00	22.00	22.00	22.00	22.00	20.75	20.75	20.75	20.25	20.75	20.75	20.75	20.75	20.25	21.50	21.25
Punchings & Plate Scrap****	21.00	21.00	21.00	21.00	21.00	21.00	19.75	19.75	19.75	19.25	19.75	19.75	19.75	19.75	19.25	20.50	20.25
Heavy Axle & Forge Turnings	19.50	19.50	19.50	19.50	19.50	19.50	18.25	18.25	18.25	17.75	18.25	18.25	18.25	18.25	17.75	19.00	18.75
Medium Heavy Electric Furnace Turnings	18.00	18.00	18.00	18.00	18.00	18.00	16.75	16.75	16.75	16.25	16.75	16.75	16.75	16.75	16.25	17.50	17.25

Grades [b] [c]	Consuming Points																
	Portsmouth, O.	Middletown, O.	Ashland, Ky.	St. Louis	Kansas City, Mo.	Detroit	Duluth	Birmingham, Ala. [d]	Chattanooga, Tenn.	Radford, Va.	Worcester, Mass.	Bridgeport, Conn.	Phillipsdale, R. I.	Los Angeles	San Francisco	Portland, Ore.	Seattle
No. 1 Heavy Melting Steel	18.50	18.50	18.50	17.50	16.00	17.85	18.00	17.00	.....	.....	15.50	15.50	15.50	14.50	14.50	14.50	14.50
No. 1 Hydraulic Compressed Black Sheet Scrap	18.50	18.50	18.50	17.50	16.00	17.85	18.00	17.00	.....	.....	15.50	15.50	15.50	14.50	14.50	14.50	14.50
No. 2 Heavy Melting Steel	17.50	17.50	17.50	16.50	15.00	16.85	17.00	16.00	.....	.....	14.50	14.50	14.50	13.50	13.50	13.50	13.50
Dealers' No. 1 Bundles	17.50	17.50	17.50	16.50	15.00	16.85	17.00	16.00	.....	.....	14.50	14.50	14.50	13.50	13.50	13.50	13.50
Dealers' No. 2 Bundles	16.50	16.50	16.50	15.50	14.00	15.85	16.00	15.00	.....	.....	13.50	13.50	13.50	12.50	12.50	12.50	12.50
Mixed Borings and Turnings	13.75	13.75	13.75	12.75	11.25	13.10	13.25	12.25	.....	.....	10.75	10.75	10.75	9.75	9.75	9.75	9.75
Machine Shop Turnings	14.00	14.00	14.00	13.00	11.50	13.25	13.50	12.50	.....	.....	11.00	11.00	11.00	10.00	10.00	10.00	10.00
Shoveling Turnings	15.00	15.00	15.00	14.00	12.50	14.35	14.50	13.50	.....	.....	12.00	12.00	12.00	11.00	11.00	11.00	11.00
No. 1 Busheling	18.00	18.00	18.00	17.00	15.50	17.35	17.50	16.50	.....	.....	15.00	15.00	15.00	14.00	14.00	14.00	14.00
No. 2 Busheling	14.00	14.00	14.00	13.00	11.50	13.35	13.50	12.50	.....	.....	11.00	11.00	11.00	10.00	10.00	10.00	10.00
Cast Iron Borings	14.25	14.25	14.25	13.25	11.75	13.50	13.75	12.75	.....	.....	11.25	11.25	11.25	10.25	10.25	10.25	10.25
Uncut Structural & Plate Scrap	17.50	17.50	17.50	16.50	15.00	16.85	17.00	16.00	.....	.....	14.50	14.50	14.50	13.50	13.50	13.50	13.50
No. 1 Cupola	21.00	21.00	21.00	20.00	15.00	19.00	21.00	17.75	20.00	21.00	22.00	22.00	22.00	18.00	18.00	18.00	18.00
Heavy Breakable Cast	19.50	19.50	19.50	18.50	13.50	17.50	19.50	16.25	.....	.....	20.50	20.50	20.50	17.00	17.00	17.00	17.00
Stove Plate	13.00	13.00	13.00	14.50	12.50	12.75	.....	12.00	.....	.....	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Low Phos. Billet & Bloom Crops	23.50	23.50	23.50	22.50	21.00	22.85	23.00	22.00	.....	.....	20.50	20.50	20.50	.....	.....	.....	.....
Low Phos. Bar Crops & Smaller	21.50	21.50	21.50	20.50	19.00	20.85	21.00	20.00	.....	.....	18.50	18.50	18.50	.....	.....	.....	.....
Low Phos. Punchings & Plate Scrap*	21.50	21.50	21.50	20.50	19.00	20.85	21.00	20.00	.....	.....	18.50	18.50	18.50	.....	.....	.....	.....
No. 2 Cupola	20.00	20.00	20.00	19.00	14.00	18.00	20.00	16.75	19.00	20.00	21.00	21.00	21.00	17.00	17.00	17.00	17.00
Machinery Cast, Cupola Size**	22.00	22.00	22.00	21.00	16.00	20.00	22.00	18.75	21.00	22.00	23.00	23.00	23.00	19.00	19.00	19.00	19.00
No. 1 Mach. Cast, drop broken, 150 lbs. & under	22.50	22.50	22.50	21.50	16.50	20.50	22.50	19.25	21.50	22.50	23.50	23.50	23.50	19.50	19.50	19.50	19.50
Clean Auto Cast	22.50	22.50	22.50	21.50	16.50	20.50	22.50	19.75	21.50	22.50	23.50	23.50	23.50	19.50	19.50	19.50	19.50
Punchings & Plate Scrap***	20.50	20.50	20.50	19.50	18.00	19.85	20.00	19.00	.....	.....	17.50	17.50	17.50	.....	.....	.....	.....
Punchings & Plate Scrap****	19.50	19.50	19.50	18.50	17.00	18.85	19.00	18.00	.....	.....	16.50	16.50	16.50	.....	.....	.....	.....
Heavy Axle & Forge Turnings	18.00	18.00	18.00	17.00	15.50	17.35	17.50	16.50	.....	.....	15.00	15.00	15.00	14.00	14.00	14.00	14.00
Medium Heavy Electric Furnace Turnings	16.50	16.50	16.50	15.50	14.00	15.85	16.00	15.00	.....	.....	13.50	13.50	13.50	12.50	12.50	12.50	12.50

FOOTNOTES

* This grade is ⅜-inch and heavier, cut 12 inches and under.
** This grade also may include clean agricultural cast.
*** This grade is under ⅜-inch to ¼-inch, cut 12 inches and under.
**** This grade is under ¼-inch to No. 12 gage, cut 12 inches and under.
[a] A consuming point includes the switching district of the cities named herein.
[b] The grades specified are, except Dealers' No. 1 and No. 2 bundles and uncut structural and plate scrap, as named and defined in the simplified practice recommendations R-580-36 of the Department of Commerce which shall be the governing specifications for iron and steel scrap hereunder.
[c] These grades represent the major classifications of iron and steel scrap. The maximum prices of superior or inferior grades shall continue to bear the same comparable relationship to those major grade classifications as heretofore existed between the prices of such superior or inferior grades and the prices of the major grades.
[d] The prices set forth are for scrap delivered to the Birmingham, Ala., consuming point, excepting scrap for Birmingham consumption originating west of the western boundary of Alabama. In the latter case the Birmingham, Ala., consumer may pay $1.00 more than the prices indicated under "Birmingham."

Delivered to a Consumer Not Located in a Consuming Point Listed Above

This maximum price is to be computed in the manner prescribed below:

A. The maximum price of scrap at the point from which such scrap is to be shipped is the maximum price specified in Paragraph I hereof for such scrap delivered to any consumer in the consuming point nearest, in terms of transportation costs, to the point from which the scrap is to be shipped less the lowest cost of transporting the scrap from the point of shipment to the consumer located at the consuming point nearest the scrap.

B. **At the Consumer's Plant to which the Scrap is to be Delivered.** A consumer, if he can establish that he has been served by the same source of scrap in the past, may pay, to the extent necessary to absorb the transportation costs from the shipping point to his plant, a price delivered to his plant which exceeds by not more than one dollar per gross ton the maximum price set forth in Paragraph I hereof for the scrap delivered to the consuming point nearest, in terms of transportation costs, to the consumer's plant. In no case shall the consumer pay a sum in excess of the price established under Sub-paragraph A hereof plus the lowest cost of transporting scrap to his plant from the point of shipment.

Billet and Bloom Crops Originating in Pittsburgh

Where the grade of scrap classified as billet and bloom crops originates in the Pittsburgh consuming point, it may be sold delivered to a consumer, located within or without the Pittsburgh consuming point, at the price established in Paragraph I hereof for Pittsburgh, Pa., plus not more than $2.50 in transportation costs from the point of origin to the consumer's plant. In no case shall the consumer pay a sum in excess of the price established under Paragraph I hereof for the Pittsburgh consuming point consumer plus the lowest cost of transporting the scrap from the point of origin to the consumer's plant.

General Provisions

A. **Unprepared Scrap.** All unprepared yard scrap shall be sold at prices not exceeding $2.50 less than the maximum prices established above.

B. **Shipment by Means Other Than All-Rail.** The maximum prices established herein have been based upon all-rail deliveries to the above-named consuming points, excepting Detroit. Where shipment to the consumer is by means other than all-rail, the maximum prices established herein, except those established for the Detroit consuming point, shall be reduced by the amount that the all-rail transportation costs to such consuming point exceed the costs of the mode of transportation used.

(*Concluded from page* 125)
the-line hauling expense.

Disadvantages resulting from the fact that switching charges may differ at different points on a railroad's line are eliminated. This is done by placing consumers in different switching districts on the same railroad on a parity insofar as their ability or inability to purchase railroad scrap has heretofore been determined by the amount of the switching charges of the railroad from which the scrap originated.

Provision is made for sale of railroad scrap, for which the railroad of origin cannot be identified, at prices not in excess of the maximums established for similar grades of nonrailroad scrap listed in the accompanying tables.

The 3 per cent brokerage commission established in the original schedule has been replaced by a commission of 50 cents per ton which may be paid to a broker or agent for scrap delivered to a consumer either at the maximum or at a lower price.

The new schedule requires railroads to take care of their regular on-the-line customers before shipping their scrap to consumers located off-the-line.

USE ABRASIVE WHEELS TO CUT GATES FROM CASTINGS

By C. C. HERMANN

BRONZE, brass and aluminum castings cannot be broken off the gates according to the practice in gray iron foundries. Casting would be damaged if that procedure were followed. The practice has been to cut the castings from the gates and cut the sprue from large castings by a band saw and more recently by an abrasive cut-off machine.

One of the latter machines, Fig. 1, is shown in operation in the Acme Brass & Bronze Foundry, Philadelphia. The casting on the table is a steam turbine nozzle cast two pieces to the mold of metal which contains 30 per cent nickel. Diameter of the gate is 1½ inches. A wheel, ⅛-inch thick, 14-inch diameter is used. The total time required to place the work on the machine table and to cut through the gate metal is 3 minutes, according to A. H. Wineland, works manager. Some of the lighter castings weigh only a fraction of an ounce and some heavier jobs weigh as much as 250 pounds each.

Fig. 2 shows the operation of the machine from a slightly different angle. No clamping device is used for holding the casting. The operator holds the casting in his hand and advances it against the wheel. Rate of cut-off to a considerable extent depends on the human factor.

The machine with a 16-inch diameter wheel is driven by a 7½ horsepower motor at a full speed of 3450 revolutions per minute. Peripheral speed of the wheel is 12,600 feet per minute. The machine is provided with a divided table which may be adjusted as illustrated in Figs. 3 and 4. In Fig. 3 the left half of the table is being adjusted to provide the right off-set so that the casting will be given the necessary support with the sprue resting on the right half of the table. The left section of the table can be lowered 5 inches below or raised 4 inches above the level of the right half. The entire table can be lowered 13 inches below the center of the wheel spindle by the hand wheel shown in Fig. 4.

At the plant of E. A. Williams & Son, Inc., Jersey City, N. J., some castings were entirely too large to place on the main table. A base, pedestal and table of an old drill press were installed within the radial reach of the machine head as shown in Fig. 5. The machine head constructed to swivel through 180 degrees can be moved around to a position over the drill press table and thus cut off gates and risers from large castings. W. C. Perrie, superintendent, claims this has enlarged the application of the machine since a large tonnage of castings made by the firm is in this class.

Fig. 5 shows the machine cutting off brass mallet heads at the rate of five per minute. These mallet heads are cast ten pieces to the mold and the gate has an area of approximately ½ square inch adjacent to the casting. One abrasive wheel lasts nearly two weeks and handles an approximate tonnage per wheel of 2½ tons of nonferrous castings.

Appointed Agents

Upton Electric Furnace Co., 2211 Grand River avenue, Detroit, recently has been appointed the Cleveland Duplex Machinery Co., Penton building, Cleveland, to handle its line of electric salt bath furnaces in the Cleveland area.

Fig. 1—Abrasive cut-off machine for removing gates and risers on nonferrous castings. Fig. 2—Same type machine shown from a different angle. Figs. 3 and 4—Divided table on machine permits adjustment so that casting is given proper support during the cutting operation. Fig. 5—Auxiliary table constructed from an old drill press extends application of cut-off machine

GATING NONFERROUS CASTINGS

(*Continued from page* 53)

provide a free flow of metal and avoid restrictions in these gates at the mold entrance so that there is no tendency to squirt or form a jet. The gates should not be so large that they do not freeze definitely before the casting unless they are connecting gates between a feeder and the casting. In that case the gate should be large enough to insure the completion of this feeding before freezing.

Most high shrinkage alloys crystallize in fairly marked crystals as can be seen readily when these alloys are fractured. In view of the tendency to crystallize rapidly as the metal cools the question of heat radiation and consequent speed of cooling has a definite influence upon the shape and size of the gates and should be carefully recognized in planning the gates.

Sharp corners as spoken of previously and as illustrated in Figs. 37 and 38 should be avoided. Furthermore, the junction between thick and thin section of casting should be studied as to whether there is a sufficient amount of fillet provided to avoid the stressing of the casting at that point through the growth of crystals as illustrated in Fig. 39. The location of the gate so as to feed such junctions is one of the details covered in previous articles and cannot be emphasized too strongly.

Where the gate joins such a point it must be of such a size as to insure feeding until the demand ceases as a result of the complete solidification of the casting at that point. Many foundrymen believe that some red brasses which have enough tin in them to be bronzes but also have enough zinc in them to be brasses do not need any feeding. Therefore, there is no provision for feeding the castings when they are being made from such alloys.

The size and location of the gates are planned with the thought that there is no need to feed, that the composition runs fairly freely and consequently, there is no practical need for forceful feeding or pouring. In reality some of those compositions are high enough in zinc in spite of the fact that they still appear red when machined so that they do have a tendency to develop smoke spots when cast.

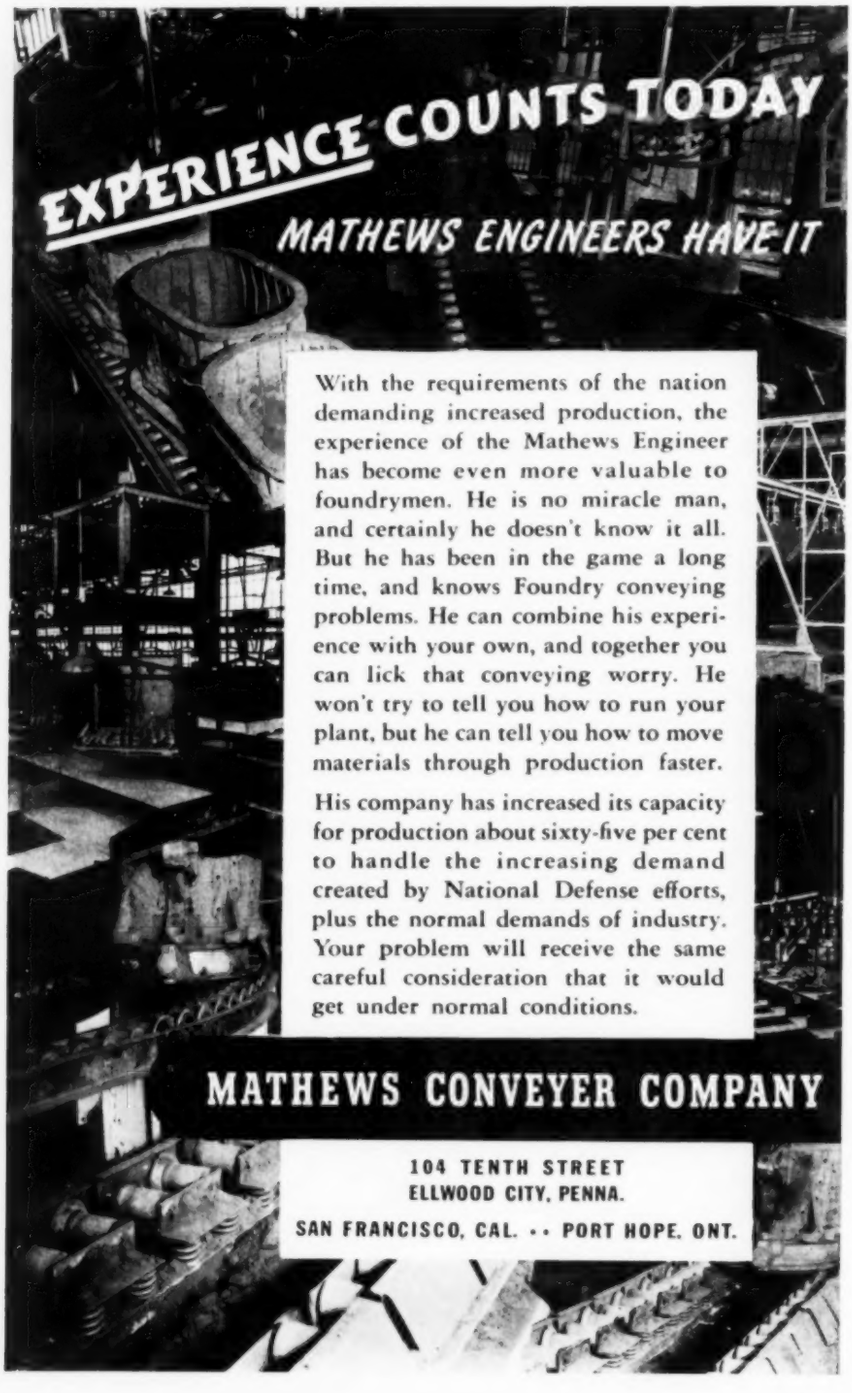
Feeders Are Necessary

That indicates that they do need to be poured forcefully so that the smoke is ejected and the mold is filled rapidly before these spots can be developed. They likewise may have a tendency to crystallize at the junction of thick and thin sections, of a heavy riser with a thinner casting or of a gate with the casting where there is not sufficient fillet. Therefore, they should be provided with feeders at those points which would supply the necessary fluid metal to take up the shrinkage during solidification.

Many so-called red brasses and some valve metals do need feeding, and consequently require gating of the size, shape and location which will provide feeding in spite of the fact that there is a general consensus to the contrary. It is not an infrequent experience to find valves leaking only slightly and in many instances a slight seepage through the wall is all that is noticeable.

Such leakage would disappear entirely when the castings were fed properly by adequate risers or molten metal to reduce the presence of microscopic openings between crystals. That is particularly true where the compositions are similar to 88-10-2, where the ratio of tin to copper is high enough to develop the secondary constituent known as the delta constituent.

The crystals occupy less volume than the molten metal leaving mi-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croscopic cavities around the crystals which must be filled by the inflow of molten metal. Of course, the molten metal must be forced to enter the cavities by the necessary static head produced by the riser of sufficient height. It will be seen from those remarks about this type of composition that the question of right shape, size and location of gate should be studied.

If the volume or number of pieces to be produced is sufficient, a series of careful experiments should be made to be sure that all the necessary precautions have been provided to insure the proper feeding and consequent production of an absolutely sound and trustworthy casting. This is a much more simple operation than it sounds. Experienced foundrymen find little trouble if they will recognize the necessity for feeding and will apply experience they have had with casting other compositions that do require feeding.

It is well recognized by most foundrymen that the test bar which regularly is made to conform to the specifications of the federal government with a web along its entire length connecting it with a riser of a specified size definitely insures a completely and well fed test bar. If such bars are cast with this feeding riser, a relatively high tensile strength and good elongation will be shown where the metal is in good condition, but where the riser is absent on the test bar cast, as is commonly done in red brass in the form of round sticks, even when the metal is in good condition the ultimate tensile strength falls off and the elongation is not so good.

Castings Will Not Leak

That is proof of the value of feeding of this type of alloy and should be applied to the production of castings just as it is applied to the production of test bars. A foundryman who will bear this in mind in planning the size, shape and location of the gates will find the resulting castings are well worth the effort and he also will find that his customer will appreciate the quality of castings to the extent of finding a minimum number give trouble from leakage, if any at all. It also will be found that the machining of the castings will develop a marked reduction in sub-surface defects.

The connection of the proper size gate with the casting is quite as important as making that gate of the proper size. In other words, where the gate joins the casting proper fillets must be provided as indicated in Fig. 40. Where the gate connects the riser or feeder with the casting adequate fillets must be provided just as much as where the gate joins the casting so that as the crystals grow at these fillets the area through which feeding takes place will not be restricted to the point where feeding is shut off.

High lead alloys which contain tin are very fluid and usually unless they contain appreciable quantities of nickel, there is little need for feeding as in the case of high shrinkage compositions. The casting does not shrink much or demand a heavy amount of feeding but as it cools the junctions between thick and thin sections or the junction of a gate with a casting will necessarily cool after the joining parts of the casting.

Hence, it is not an infrequent experience to find that the last point to cool did need some feeding in order to avoid a porous condition even though that condition is microscopic in size. Therefore, the gate size, shape and filleting must be attended to carefully if the best results are to be obtained even in compositions where feeding is not so vitally important. The last point to cool in such castings must be provided with a feeder not of large size, but sufficiently large to cool after casting has cooled.

There is one other practice that is more or less common in the nonferrous foundry that influences the size of gates or connecting runners and that is the practice of flowing

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off a certain quantity of metal as the mold is filled. That flowing off process is done primarily to produce a definite temperature gradient between casting and riser or to wash out any foreign material that may have been lodged in the casting cavity.

Whatever the objective is in such flowing off process the gates through which the flow off takes place and the gate through which the metal enters the mold must be designed in shape, size and location so that the proper results from this practice will be insured. Since this flow off practice does influence the temperature gradient and does tend to locate a certain portion of the hottest metal in the mold, the gates connecting the risers with the casting must be of adequate size to permit all the necessary feeding to take place before the gates freeze. The gates connecting the runner with the casting through which the pouring takes place must be of the right size and shape and so located that the temperature conditions intended to be produced by the flowing off process will definitely occur.

Fig. 41 illustrates some of the shapes of gates and runners that too frequently are found to exist in routine practice among foundrymen and which necessarily must result in trouble if regularly practiced. They may work effectively in the case of gray iron or steel so far as the author is aware since the writer does not feel he knows anything about the proper shape or size or design of gates for ferrous metals, but certainly for nonferrous practice they are inadvisable. More suitable shapes are shown in Fig. 42.

This is the eighth of a series of articles on gating nonferrous castings. The first seven appeared in the November and December, 1940, and the January, February, March, April and May, 1941 issues.

THE EDITORS

ANNOUNCING

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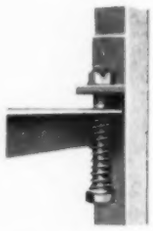

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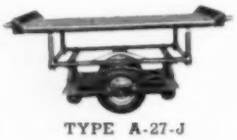

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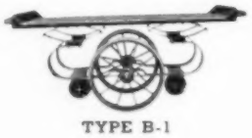
TYPE A-27



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CM&D Core Trucks MUST Pay for Themselves

Book Review

1940 *Supplement to A.S.T.M. Standards Including Tentative Standards, Part I, Metals*, cloth, 478 pages, 6 x 9 inches, published by the American Society for Testing Materials, Philadelphia, price $3.00.

This volume as its title indicates is a supplement to Part I of the 1939 *Book of A.S.T.M. Standards*, and contains all the newly adopted and revised standards and all the new revised tentative standards in the metals field that have been accepted since the appearance of the book. Of the 40 standards published in this volume 14 are newly adopted and 26 are replacements of existing standards in the 1939 book. Similarly 44 of the 59 tentative standards are replacements while the remaining 15 appear for the first time. Current tentative revisions of standards on metals also are given in this publication. Yellow stickers also accompany the Supplement for attachment to the appropriate pages of the 1939 *Book of Standards*, to call attention to such standards which have been superseded or withdrawn completely.

Gear Motors

U. S. Electrical Motors Inc., 80, 34th street, Brooklyn, N. Y., has introduced new double and triple reduction geared motors up to 30 horsepower at 91 revolutions per minute. In the larger units the pyramidal gear pedestal provides support for the extra torsional strains and load shocks of geared power. All castings are normalized to insure permanent alignment of gears and bearings. Normalizing removes internal stresses, prevents warping with age and adds years of trouble free service. Primary and secondary gears dip in a large oil reservoir in the pyramidal base of the motor. This design provides an oil supply to all bearings and gears.

Milwaukee Chaplet & Mfg. Co., 539 Thirty-first street, Milwaukee, now is located at 1023 South Fortieth street, Milwaukee.

PRODUCTION AIDED BY SCIENCE

(*Continued from page 49*)

to an already carefully prepared steel. The elemental composition of the steel having been fixed at the melting furnace, it is the task of the heat treater to use his tools to adjust those elements so that they will meet the highest standards of quality as controlled by sensitive temperature measuring and recording instruments. Uniform and accurate heat treatment is relatively simple. However, there has been a strong trend to newer types of alloyed steels for special application, which places a burden of marked responsibility on the heat treating department.

Inspection of a steel casting implies both eye and instrument analysis. The inspection by eye includes surface finish, dimensional properties, hydrostatic test and destruction test, the latter to determine internal soundness. Inspections by instruments may be many and varied. The physical testing laboratory has for tools tensile, bend and compression machines, hardness, impact and fatigue and creep instruments, and the microscope and radiograph. While few foundries have all of these instruments within their own plants, they are available for routine or periodic use.

The aid of science has been given to the foundry from other sources and it is worth while mentioning that purchasers of steel castings have offered great help by alteration of troublesome designs and pure research on the foundry problem by the U. S. Naval Research, Battelle Institute and various technical schools has been of inestimable value. The industry realizing the effect of joint efforts has organized into societies for the advancement of its art. The Steel Founders' Society of America, The American Foundrymen's Association — those two together with the help of many technical papers published by the American Society for Metals and the American Institute of Mining and Metallurgical Engineers have thrown light on previously hidden vital factors.

The steel casting industry recognizes its debt to science. With the advent of each new development it becomes more evident that science has and is fortifying the steel casting to withstand the ever increasing needs of industry.

Foxboro Co., Foxboro, Mass., has erected its own building at 5151 Baum boulevard, Pittsburgh, where servicing department and offices are located. The territory served by the Pittsburgh branch includes parts of Pennsylvania, West Virginia, Ohio and Kentucky. A. H. Shafer continues as manager of the Pittsburgh branch.

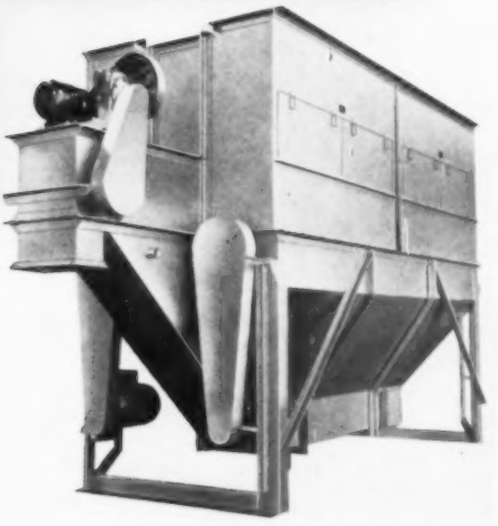
Publishes Report

Engineers' Council for Professional Development has published its eighth annual report, for the year ending October, 1940, including committee reports on: Engineering schools; professional recognition; professional training, student selection and guidance.

A Correction

In a footnote which followed the presentation of the second part of a foundry training program in the March and April issues of THE FOUNDRY, credit inadvertently was not given to several men who collaborated with James G. Goldie, foundry instructor, Cleveland Trade School, Cleveland. The complete list included: Michael Horkan, foundry instructor, East Technical High School; Harvey R. Riedenbach, Collinwood High School; Norman Krupp, West Tech High School and Fred Pharr, East Tech High School, Cleveland.

THE INDUSTRIAL HYDRO-WHIRL *Collects the Dust*



Here's one of four 40,000 CFM Units recently installed to take care of dust from polishing, buffing, and grinding of parts in a Detroit Airplane Motor Plant.

. . . designed to meet the exacting requirements of grinding, polishing, and sanding processes in IRON, ALUMINUM and MAGNESIUM ALLOY FOUNDRIES

Founders are now provided with a practical, sure, economical way of eliminating the dust hazard through the Hydro-Whirl—a wet dust collector. All dust is "water-whirled" out of the air and is formed into a sludge which is automatically removed by conveyor.

Great savings in building heating costs are obtained because the cleaned air may be returned to the building. No sparks can get through the ISM Hydro-Whirl. Standard parts are used throughout the units.

The Hydro-Whirl is manufactured in sizes from 2,000 to 40,000 C.F.M.

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Manufacturers of Hydro-Whirl Dust Collectors and Spray Booths, Ovens, Mechanical Washers, and Industrial Ventilation Systems.

625 E. FOREST AVENUE **DETROIT, MICH.**

ARSENAL MAKES ORDNANCE

(*Continued from page 55*)

tomer. Lynx eyed inspectors aided and equipped with all the tools and equipment of modern science present a more difficult barrier to the passage of defective material than that of the camel through the needle eye referred to frequently in one of the better known Biblical quotations.

Casting loss in the arsenal foundry is almost negligible through a combination of favorable factors which include: The best of raw materials, sand and metal; highly efficient melting equipment and methods; highly skilled and long term employes; desirable working conditions; and last but probably most important of all there is Herman Alex, veteran superintendent who has been an employe in the arsenal since 1892 and superintendent for the past 30 years. For many years he also has been superintendent of the pattern shop and the carpenter shop. A year ago he served as chairman of the Quad-City Chapter of the American Foundrymen's Association.

Herman served his apprenticeship in a foundry across the river in Davenport, Iowa, and then transferred himself, his tool kit and his inquiring mind to the arsenal foundry and has been on the job there ever since, a mere matter of—well, figure it out for yourself, 1892-1941, looks like 49 years.

He is not exactly a contemporary of Old Man River which has been rolling along deep and muddy on its 3000-mile journey to the sea since the North American continent rose from the flood waters of the Great Deluge in the dim and distant past, but he has accumulated quite a store of foundry lore in a period of nearly 50 years. He has seen good men come and go, commandants, colonels, majors and captains and he has seen activities in the arsenal fluctuate in peace and war. The so-called Spanish war in 1898 caused only a mild flutter. Activities reached a peak in the World war when a skeleton force of 1000 or 1500 was raised to 15,000.

Force Increased Gradually

At present the arsenal force has been increased gradually to 7500 with prospect of topping the old record if hostilities in Europe are prolonged to anything like the extent anticipated by all public spirited anticipators and professional predicters. Students of the works of the late Mr. Kipling will find quite a bit of resemblance between the work of Mr. Alex and that of Subedar Pragg Tewarri who did a rather neat and commendable job in the affair of *The Grave of* 100 *Heads*. There is a widow in sleepy Chester who weeps for an only son. There is a grave by the Pebang river, a grave that the Burmans shun AND there is Subedar Pragg Tewarri who tells how the deed was done. Subedar Pragg and his ranking assistant Hira Lal knew how to do a day's work!

The arsenal foundry is not a slap bang production shop. Certain castings are made in considerable number, but the majority in almost infinite variety represent experimental orders for small numbers. Molds are put up on the floor and on molding machines on both sides of a central gangway. Molders are highly skilled mechanics who finish their molds as molds should be finished to produce perfect castings. Pouring basins on the large molds and sprue openings on the small molds are as smooth and as clean as any part of the mold inside the flask. Most remarkable feature of all, reminiscent of the days when molders were artists with a proper and legitimate pride in their mental and manual dexterity, every man's shovel is kept as clean and shining as it was the day it left the maker's hands.

HERE'S THE END OF YOUR SEARCH FOR A PRODUCTION ELECTRIC FURNACE THAT CUTS MELTING COSTS AND ASSURES BETTER CASTINGS

In scores of America's busiest foundries DETROIT Rocking Electric Furnaces are speeding up production, cutting costs and improving product quality.

The DETROIT Furnace is a fast melting unit. It produces a large number of heats large or small in rapid succession all day long. It is thereby very efficient—also flexible and adaptable to the foundry needs for molten metal. The quality of the product is second to none. For close chemical and metallurgical control the DETROIT Furnace with its exclusive, automatic stirring action under non-oxidizing conditions, simply cannot be beaten.

But don't take our word for these claims—find out for yourself. Let us arrange for you to see a few of these furnaces in operation and talk to their owners yourself. Get the lowdown first hand from those who know. Write for further facts today.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN

The foundry is a single, straight one bay building 50 x 300 feet spanned by two electric traveling cranes, without any columns to serve as trash accumulators and without any side bays, leanto's or dog houses. Floor layout and location of various pieces of equipment have been changed from time to time with a view of obtaining smoother operation and in keeping with the number of employes as they fluctuated up and down according to the related activities of the arsenal. Flasks that are not in use are stacked outside in an open space alongside the foundry where a crane is available for handling the larger units.

Molds are made in three types of flasks, light castings in wood snap flasks, light and medium weight castings in aluminum flasks and heavy castings in cast iron flasks. Flask making is simplified by providing patterns for the ends and sides and for the bars. Majority of the flasks are plain square or rectangular units, but odd shapes and sizes as shown in Fig. 2 are available for long running jobs with irregular parting lines. All bolt holes are cored and no machining is required in assembling sides and ends. Bolt holes in the end pieces are in the form of slots which greatly facilitate the insertion of bolts and any slight adjustment necessary in fitting the parts together in a neat and workmanlike manner. The joints are not machined. Careful molding insures a fairly even surface. It is claimed that a seal tight machined fit is of no particular advantage. The sand on the inside of the cope and drag come into intimate contact at the joint and any slight irregularities in the metal joint serve as exits for gas and steam when the mold is filled with metal.

Little Machine Work

The only machine work on the flasks is in fitting the guides. These are drilled to a standard size and attached to the ends of the flask with the aid of a jig. Guide pins presenting a hazard in jamming, twisting or breaking in the shakeout process, are not attached to the flasks. Close fitting steel pins hold the flasks in place on the machine, or pattern plate, or on each other during the sand ramming process. These same pins again are employed while setting the cope on the drag after the mold is finished. The pins are removed and used on the next mold.

Attention also is directed to the simplified arrangement for lifting the copes that are light enough to be lifted by hand. A dovetail boss is formed on the outside at the end of each side piece. As part of his equipment each molder is provided with two short lengths of 1-inch steel bar stock forged at one end to fit in these slots. When the cope is set in place the handles are withdrawn. No claim is made that the idea is original since it has been in use for several years, particularly in automobile and other types of production foundries responsible for the invention, development and use of so many time and labor saving gadgets and shop kinks in the foundry.

A typical lot of aluminum, brass and bronze castings is shown in Fig. 1 on the floor of the cleaning room equipped with band saws and sprue cutters for the removal of gates and risers. The heavy risers are removed on a disk machine made by the Tabor Mfg. Co., Philadelphia. A thin, circular abrasive disk revolving at high speed cuts through the metal with remarkable speed and facility. Part of the machine is shown at the extreme right in the illustration.

The lever projecting from the top is operated by hand and regulates the speed with which the disk descends. The castings are brought in wheelbarrows from the various floors and the same wheelbarrows are employed to carry the gates and scrap back to the furnaces or to the stock bins. Long familiarity enables the operators to keep the wide range of metals separated during the shakeout, transfer to the cleaning

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room and return to the furnaces.

Method of molding and gating two groups of aluminum castings is shown in Figs. 4 and 5. Fig. 5 is a group of pistol grips. The sprue is the center of a long runner formed partly in the drag but mostly in the cope. The gate to each casting also is formed partly in the drag and partly in the cope. The runner extends a short distance beyond the end gates to serve as a dirt catcher in the rather remote event that any loose sand might be washed in with the metal. A small shrink bob above the runner and in front of each pair of castings supplies the small amount of feeding metal necessary and insures the production of solid

Fig. 4 is 40 links for rifle ends where the bayonet is attached. They are poured in two groups of 20 on each sprue. Runners and gates are in the cope. Makers of small castings will appreciate the nicety and accuracy of the pattern equipment which leaves the small green sand cores standing in the drag without nails or wires.

Patterns for small castings are mounted according to any one of several methods for use on the bench or on machine. Usually aluminum replicas of the original wood are made and finished and then mounted in frames filled with a compound made by the Tamms Silica Co., Chicago. The compound is mixed with water and spilled around the patterns where it solidifies into a solid mass resembling stone. In some cases one plate or frame is sufficient for use on the molding machine, while in other instances two plates are necessary, one for the cope and one for the drag.

In the general layout of the building the well lighted and well equipped foundry office is followed by the cleaning and shipping department. After the castings are cleaned, weighed, inspected and recorded they are shipped by truck to other departments of the arsenal where they are incorporated in the construction of guns, trucks and other pieces of armament and military supply.

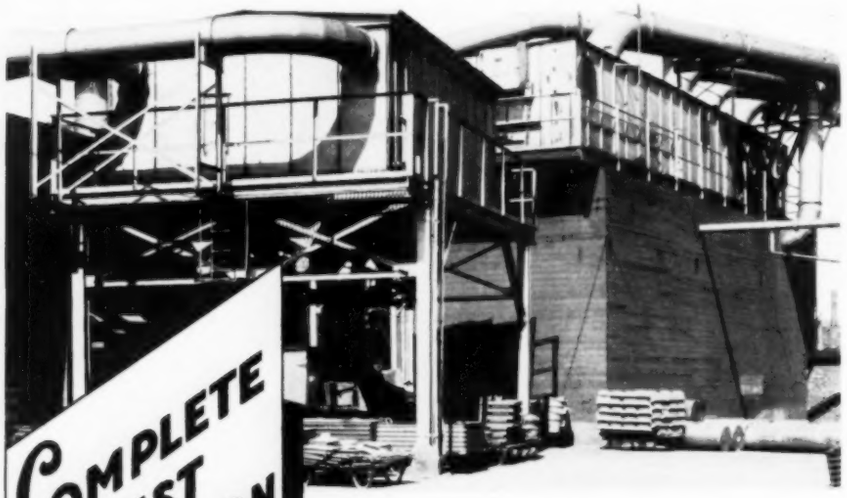
Use Electric Furnaces

Heavy and medium weight iron castings in wide variety are molded on the floor by hand or on machines in the next section of the floor. Nonferrous castings are molded on the floor in the vicinity of the battery of melting furnaces located in an alcove. The battery includes three 350-pound electric furnaces made by the Detroit Electric Furnace division, Kuhlman Electric Co., Bay City, Mich. These three furnaces melt the greater bulk of the brass and bronze for each day's operation. Aluminum is melted in two tilting type, gas fired furnaces, one equipped with a crucible and the other with an iron pot.

Melting equipment formerly employed before the advent of the electric furnaces includes a battery of nine gas-fired pit type crucible furnaces. They are used occasionally for melting special heats, but their usual function is for heating the crucibles. The cover on each furnace is made up of a number of special refractory blocks set in a steel band. The cover is suspended from a post at one side of the furnace. A cam arrangement on the post facilitates removal of the cover before the pot is lifted. A long steel bar with a toe at one end is employed for the purpose. The toe is inserted in a hole in the cam. Slight pressure on the long lever arm raises the cover an inch or two and then it easily is swung to one side.

On the opposite side of the central gangway, there is the core room with a single car type oven and three shelf ovens fired with gas and equipped with automatic temperature control. Further along spouts from the two cupolas project through the wall near the center and the electric furnace is located in the same general vicinity.

This is the second and concluding article dealing with foundry and related activities at the Rock Island Arsenal, Rock Island, Ill. The first article was presented in the April issue of THE FOUNDRY. THE EDITORS



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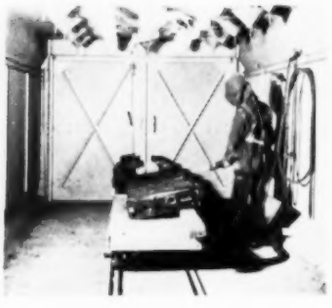
The Oval Bags STAY Like New in filtering capacity. They WILL NOT PLUG even when collecting dust from moist materials. And no bag replacements are needed for an average of more than ten years.

But let us tell you ALL about this unusual dust arrestor. Ask us to send an Engineer to explain Parsons design in full detail and make recommendations for your particular dust situation. Or, Write for Bulletin DA-6. . . .



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THE NAME PLATE THAT MEANS QUALITY
PARSONS
PARSONS ENGINEERING CORPORATION CLEVELAND

OPERATES MECHANIZED SHOP

(*Continued from page* 51)

dries in Canada and the United States it was more than adequate during the lean years between 1929 and 1939.

Then the bugles sounded. Not the late Mr. Tennyson's horns of elf land faintly blowing, but the screaming, brazen bugles of war. As on a former occasion 25 years before, Canada immediately was flooded with orders for machine tools, guns, tanks, ships, airplanes, ammunition, and all other forms of equipment and supplies needed to carry on highly civilized warfare designed to destroy all material possessions and sacrifice the lives of millions of young men who have no personal quarrel with each other.

Swamped With Orders

The inundation of domestic and war orders so swamped the foundry that it was in worse condition than the original shop vacated in 1925. Again the management was faced with the problem of increasing production in a shop already crammed to the bursting point. Three alternative courses were presented, enlarging or extending the present structure, erecting an additional foundry building, or rearranging the existing floor space and methods of operation. Extensive survey and study resulted in adoption of the third alternative.

It is claimed that the installation of sand handling equipment, roller conveyors and a system of continuous pouring has increased production approximately 50 per cent. Several of the accompanying illustrations show conditions before and after the changes were made. The National Engineering Co., Chicago, working in close co-operation with the plant engineering and foundry staff of the Canadian Westinghouse Co., designed the plans and supplied and installed the equipment.

The continuous pouring system in which the same flasks may be used several times each day has reduced the number of flasks required under former conditions. Elimination and removal of great stacks of empty flasks has greatly increased the available floor space.

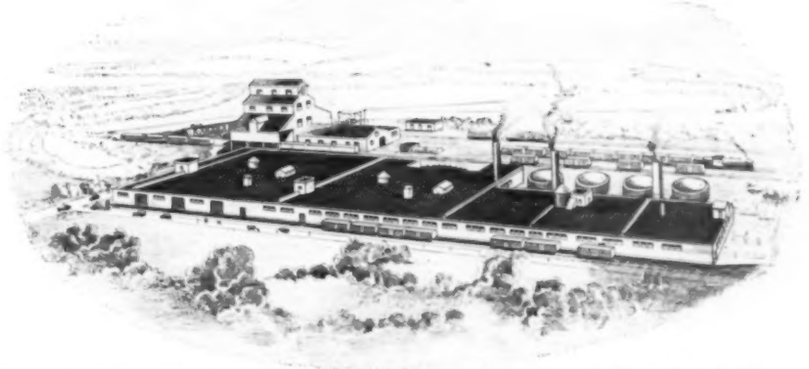
A row of steel columns supporting the roof and crane runways divides the building longitudinally into two main bays with the iron foundry occupying the entire first bay, and the brass foundry and core room occupying the second bay. A third narrow bay on the outside of the second is laid out in a series of bins for coke, pig iron and scrap and for concrete open top bins in which molding and core sand are stored until needed. The sand preparation plants, to be referred to more in detail later, also are located in this bay. Raw materials in railroad cars enter this bay on an elevated railroad track and are unloaded by an electric traveling crane, coke and sand with a grab bucket and ferrous material with a magnet. The crane loads the sand mixing hoppers, removes the prepared facing or core sand in boxes and also loads the materials for the cupola charges on hand propelled buggies.

The melting department with three cupolas made by the Whiting Corp., Harvey, Ill., charging floor, elevator, mechanical chargers and blowers is located at the south end of the iron foundry bay. A monorail, part of the new equipment, extends from a point near the cupolas to the far end of the conveyor line and greatly facilitates the distribution of the molten metal.

A battery of molding machines extends in a long line close to the pillars which separate the two bays. Each machine is served by an individual sand chute and by an air hoist which lifts the empty and loaded flasks on and off the machines and on to one of the roller

GOOSE LAKE

Fire Clay and
Fire Clay Flour
Fire Clay Brick
Therm-O-Flake Insulation



Goose Lake Clay Deposit with Clay Grinding and Fire Brick Plant

Illinois Clay Products Company

JOLIET, ILL.

conveyor lines extending from a point near the machines to the gangway on the opposite side of the building. A narrow gage track and transfer car facilitate the movement of completed molds to any convenient conveyor line.

The rollers are arranged to project but a short distance above the plates between. Molds are pushed in constant succession from the end near the molding machines, to the opposite end where they are filled with iron in orderly sequence. The flasks are dumped at three points where the sand falls through a grating on to a belt which carries it back to the reconditioning plant, the castings are carried to the cleaning room, and the empty flask is started on the return journey to the molding machine station.

A section of the floor beyond the mechanized unit is devoted to the production of heavy castings in green, skin dried and dry sand molds made either in flasks or in pits in the floor. Molders in this section are highly skilled old timers who work with full patterns, skeleton patterns, or with spindle and sweep. Molds in the floor are dried with gas jets. The entire bay is served by a 50-ton electric traveling crane and by a wall crane on a lower track.

Castings are cleaned on the remainder of the floor in this bay equipped with pneumatic tools, grinding wheels and pressure blast devices supplied by the Pangborn Corp., Hagerstown, Md. All are inspected carefully, some are tested for air and water pressure and then they are shipped either to the machine and assembly shops of the company, or direct to outside customers.

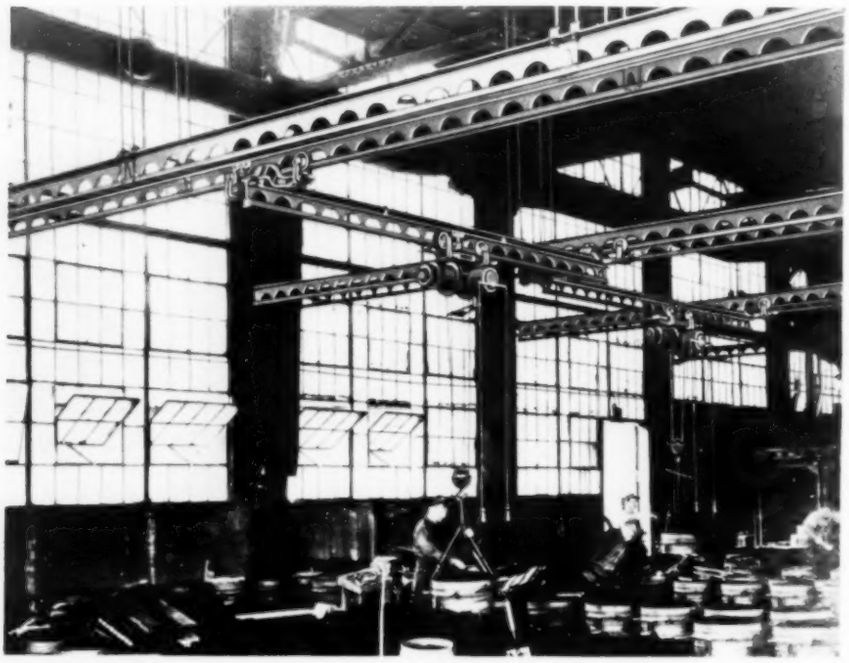
Taking the various items in the second bay in the same order, that is progressing from south to north, the first section is occupied by the department where all the smaller cores are made on the second floor and inspected, assembled if necessary on the first floor and dispatched to the various molding stations. The foundry office is next followed by a space where the charges for the cupola are loaded on buggies and weighed. The nonferrous foundry equipped with electric, open flame and pit furnaces occupies approximately half the entire space in this bay. Detailed reference to this and the coremaking department will appear later. Remainder of the space in this bay is occupied by the sand preparation plants, core room and core ovens. All the medium and large cores are made in this section and dried in four coke fired ovens, one 8 x 10 x 26 feet and the other three 10 x 10 x 26 feet.

Change Cupola Practice

Elaborating this brief general presentation, a more detailed description of several features covers many points of interest.

Changes made in the foundry during the past year involve several adjustments in cupola practice. To meet present conditions plans are under way to replace two of the cupolas with units of smaller diameter. The shells will be cut above the charging door. The stacks above that point and projecting high above the roof will not be disturbed. The shells below the charging door will be removed and replaced by shells lined to 32 inches diameter. Under the former conditions the molds were accumulated during the morning and early afternoon. They were poured between 1 and 5 p. m.

Under the new mechanized arrangement pouring commences at 10 a. m. and runs continuously through the day. The same amount of metal formerly poured in 4 hours now is poured in 7 hours. Operation of the cupolas has to be retarded to spread the heat over a longer period. This has been done by reducing the blast and the coke ratio. Present cupolas are lined down to a diameter of 42 inches and take a charge of 1200 pounds made up approximately of 30 per cent steel scrap, 30 per cent bessemer pig iron and 40 per cent miscellane-



HANDLE MOLDS THIS MONEY-SAVING WAY

In many foundries a Cleveland Tramrail System, as illustrated above, cuts costs and lightens the burden.

Here the drag and cope are made separately on a sand slinger. They are closed and arranged in rows for pouring by the Cleveland Tramrail System. The same equipment is used for pouring.

The variable speed rope-operated controller has many control points which permit delicate control and handling operations.

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OVERHEAD MATERIALS HANDLING EQUIPMENT
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ous iron scrap and shop returns.

With occasional special mixtures, the iron is divided into two main classifications, a soft machineable iron and a harder iron for air brake castings. This iron calls for 30,000 pounds per square inch tensile strength and in a machinable range to permit the use of high speed automatic tools. The following analysis meets the specification satisfactorily: Silicon 2.20 to 2.30 per cent, total carbon 3.20 to 3.30 per cent, sulphur under 0.10 per cent, phosphorus under 0.20 per cent, manganese 0.70 to 0.80 per cent.

Ladles of 1200 pounds capacity employed to pour the majority of the castings are filled under ordinary short spouts. Large ladles up to 25 tons capacity are filled in a large brick lined pit some distance from the front of the cupolas. Extension spouts are employed to carry the metal from one furnace to the ladle, or if necessary from two or from all three cupolas simultaneously. Large ladles are handled by the electric traveling crane. The smaller ladles suspended from cab type hoists made by the Shepard-Niles Crane & Hoist Co., Montour Falls, N. Y. travel under a monorail loop which extends from a point near the cupolas to the most distant roller conveyor on which the molds are accumulated.

All Charges Are Weighed

Cupola charging materials from the stock bins in the fourth bay of the foundry are picked up by the crane and loaded on buggies operating on a short narrow gage track near the cupola end of the building. The buggies pass over a floor scale where a record is kept of the weights and any necessary adjustments made in the component parts. The buggies then are pushed on to an elevator and carried up to the charging floor equipped from one end to the other with storage tracks. A transfer track enables the operator to shunt a buggie on to any desired track.

A latch in the center of the track holds the buggie in line during the transfer. In like manner the buggies in proper order are taken from the storage tracks and spotted in front of the cupolas. Charging is done mechanically through large doors on two sides of the cupola. With the buggie in position the operator opens a valve which raises a section of the floor at a sharp angle. The anchored buggie is tipped and the charge slides into the cupola. Instead of the ordinary type door, the charging opening is protected by a chain screen, a safety feature which protects the operator, prevents exit of flame or sparks, yields readily to the entering load, and readjusts itself when no material is going through the opening.

Charging devices on the outside of cupolas No. 1 and 3 are single. Those between 1 and 2 and between 2 and 3 are double. One tips to the right and one tips to the left. Cupolas, charging devices and other accessories were designed and installed by the Whiting Corp., Harvey, Ill. Thin sandstone slabs from a deposit located about 30 miles north of Toronto are employed to patch and repair the cupola linings in the melting zone area.

Blast for the cupolas is supplied by two positive pressure blowers on a mezzanine below the charging floor. The blowers were built by a company merged in recent years with the Connersville Blower Co., Connersville, Ind. Except under exceptional conditions only two cupolas are in operation. The third stands as a spare. While the aim of many foundrymen is to melt larger and larger quantities of iron in shorter and shorter time, the problem in this foundry was to melt at a speed far below normal capacity of cupola and blower. The blowers are operated at a speed to deliver the blast at a pressure of four ounces.

As stated in the beginning the principal reason for revamping the gray iron and brass foundries was

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to conserve floor space and to reduce the cost of producing the castings. An exhaustive analysis was made of the entire situation. Under the former set up the gray iron foundry 450 feet in length was laid out in three longitudinal bays, one 55 feet wide and the other two 70 feet wide each, a total floor area of 87,750 square feet. The brass foundry in another building covered a floor area of 21,000 square feet including molding, core room, melting room, locker and wash room, and office space. The core room of the gray iron foundry occupied a floor space of 10,750 square feet and the gray iron foundry office a space of 400 square feet, a total floor space for the two foundries of 119,000 square feet.

Under the new arrangement the gray iron foundry and the brass foundry with the various core rooms, offices, wash and locker rooms have been consolidated into two bays 450 feet in length, each bay 70 feet wide, a total floor area of 63,000 square feet, plus an additional area of 3500 square feet for the second floor in the new core room. Production has been increased approximately 50 per cent.

Before revamping, the iron foundry occupied three main bays. The first bay next the office and now used for other purposes had a space 55 x 75 feet devoted to core assembly. The next section 55 x 300 feet was used for making small and medium size molds. All the small molds were made either by hand or on small molding machines. All the sand was handled by hand and the molds also were set out by hand. Medium size molds were made on jar and rollover machines and handled by cranes. The last section 55 x 75 feet was the cleaning room for all castings with the exception of heavy castings molded in pits. These were cleaned at the end of the main bay.

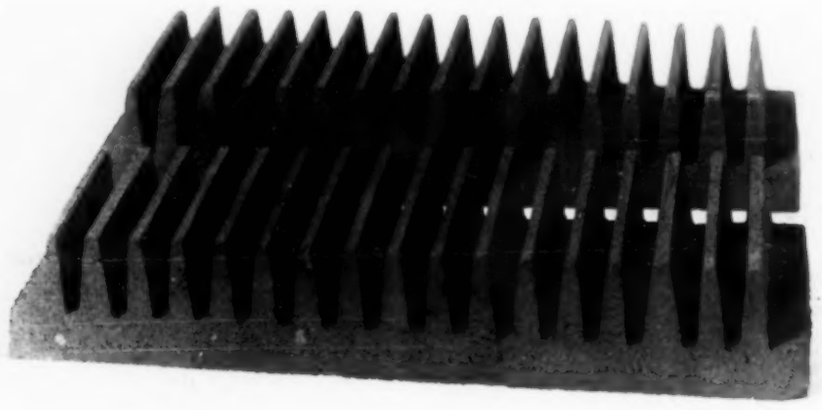
The center bay with the cupolas at one end, had one side near the cupolas devoted to squeezer work. Molds were set out by hand. Several molding machines with roller conveyors running longitudinally served for mold storage. These molds had to be handled either by the 50-ton electric traveling crane or by a 5-ton wall crane. Poured molds were transferred to a central shakeout and the flasks were brought back by the same cranes. Pit molding was carried on at the extreme end of the bay. Large castings were cleaned in the vicinity. The third or west bay served many purposes. The first 75 feet was a sheet iron shop for another department of the works. The next 175 feet was used for storage of pig iron, scrap, steel scrap, coke and limestone. The next 50 feet was occupied by ovens for drying dry sand molds. Remainder of the bay was devoted to the production of medium and large cores.

Sand Prepared at Night

All sand in the first bay was prepared by hand at night. Sand from the middle bay was removed by grab bucket from the shakeout pit, or from the floor where some of the molds were shaken out and piled in a heap in the center of the main bay. From here it was transferred by grab bucket to a grating in the floor. A belt carried the sand to a rotary screen discharging into an elevator. This in turn discharged the sand on to a distributing belt which filled the hoppers above the molding machines. Moisture and new sand were added to the heap on the floor. Obviously proper control could not be exercised under these conditions. In the brass foundry all the molds were dumped on the floor and the sand was cut over by hand. Core sand for the two foundries was prepared in three different places, brass foundry, small core room and large core room.

This is the first of two articles covering the conversion of a prominent Canadian foundry into a completely mechanized plant. The second and concluding article will appear in an early issue of THE FOUNDRY.

THE EDITORS



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In one foundry after another the installation of the Clearfield Mixer has resulted in reductions of 30% and more in core oil with better, stronger cores.

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PENNSYLVANIA, U. S. A.

(*Concluded from page* 124)

course held Thursday took the form of discussion of a progress report by the committee on analysis of castings defects, a subject ultimately to be covered by a shop handbook to be compiled by the committee. Of the 36 defects listed, 19 were opened for discussion. A defect termed as a combination blow and shrink, notably common in light work, called forth the bulk of comment. This defect occurs in cycles with numerous foundrymen, sometimes in the same pouring or in a series of castings while being entirely absent under apparently similar conditions as to melting practice and materials. The consensus of opinion appeared to indicate the defect is due to both gas and metal, and while difficult to eliminate entirely, shops have reduced the defect materially in some instances and apparently by different procedure.

Defect causes due to design, listed by the committee as being none, was mildly questioned and the matter resolved into general agreement that the matter of design should prompt plans to develop foundry consciousness on the part of the designing engineer to a greater degree.

Cite Major Defects

Major defects cited are: blows, gas holes, pin holes and blisters; scabs, buckles, rattails, pull down and blacking scabs; cuts and washes due to gas and metal erosion; inclusions (a) sand, (b) slag and (c) foreign material; crushes; swells, strains, fins and sags; drops; tickers and rats; shifts (a) cope, (b) cheek, (c) drag, (d) core and (e) pattern; ramoff and ramaway; penetration (a) mass penetration and (b) expansion and contraction of sand; fusion; core raise; cracked castings (a) mold, (b) core, (c) design, (d) contraction and (e) handling; shot iron and cold shots; hard spots, hard areas and mass hardness; open grain structure; shrinks; warpage; segregation; gassy metal or so-called oxidation; runouts (breakouts); misruns and cold shuts; scars, seams and plates; off specification; inverse (internal) chill; broken castings; no cores, wrong cores or core set wrong; poured short; rough surfaces; untrue to pattern; clamp off; porosity; combination blow and shrink; chill defects as regards chilled castings (a) too high, (b) too low and bleeders.

As causing these defects, divisions of operation contributing to one or more of them were listed as follows: A—design; B—pattern, flask equipment and rigging; C—sand; D—cores; E—molding practice, gating and risering; F—iron composition; G—cupola operation; H—pouring and I—miscellaneous.

Lecture Course COVERS CORES

ONE of the most interesting and well attended features of the convention was a series of lectures on "Core Theory and Practice" presented on four successive afternoons by Harry W. Dietert, Harry W. Dietert Co., Detroit. The first lecture presented on Monday under Chairman Harry M. St. John, Crane Co., Chicago, related to core binders. According to the speaker these were divided into 3 general classes, as follows: Those which become firm on freezing, those which become firm at room temperature, and the third which become firm on baking.

The first type contains only water which freezes at low temperature, and will serve under suitable conditions in cores, as has been determined experimentally. The second type includes sodium silicate, portland cement, rubber cement, and chemical cements. The third type contains a large number of binders such as core oils, rosins, rosin oils, pitch, sulphite binders, protein binders, molasses, cereal binders, clay, bentonite, silica flour, sawdust and wood flour. With each type the

30-DAY DELIVERY on Overhead Cranes

We can give what amounts to immediate delivery on hand-operated, overhead cranes up to 10-ton capacities. Delivery on floor - controlled, electric - operated overhead cranes and special types from 45 days to 8 or 10 weeks, depending upon specifications.

Need a Good JIB CRANE in a hurry?

We can supply you with wall, mast, or pillar type Jib Cranes virtually from stock. Easily and quickly installed, this equipment made in our plant to your specifications. See page 10, our Catalog PCR100D.

1-ton Crane Speeds HEAT TREATING

Serving a battery of heat treating furnaces for a well-known concern, this 1-ton crane installation was recently planned and placed in service by Chicago Tramrail. Its low cost and the speed with which it can be installed in your heat treating department will impress you. Send us a rough sketch of your layout, or ask us to send one of our Engineers . . . we'll be glad to make quotations and delivery dates.

CHICAGO TRAMRAIL CO.

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Specializing in Service to Foundries Throughout the Middle West

2910 CARROLL AVE. Phone KEDzie 7475 CHICAGO, ILL.

speaker gave extended information on various characteristics and properties.

Second lecture presented on Tuesday with Hyman Bornstein, Deere & Co., Moline, Ill., presiding, was devoted to a discussion of core mixtures. In his talk Mr. Dietert pointed out the requirements of a core mixture, and then described numerous core mixtures for steel castings, malleable iron castings, gray iron castings. Brass and bronze castings, copper castings, aluminum castings and magnesium castings. With each class of cores Mr. Dietert gave information on choice of sand and binders to meet specific applications.

On Wednesday afternoon Mr. Dietert presented the third lecture with Fred J. Walls, International Nickel Co., Detroit in the chair. It was devoted to an extended and detailed description of methods of controlling properties of cores. Physical properties of cores is important, and the determinations of those is a requirement in selecting materials used and prescribed and controlling core room practices. In the lecture the speaker described the methods and equipment used for the tests, and the relation of the test to core properties.

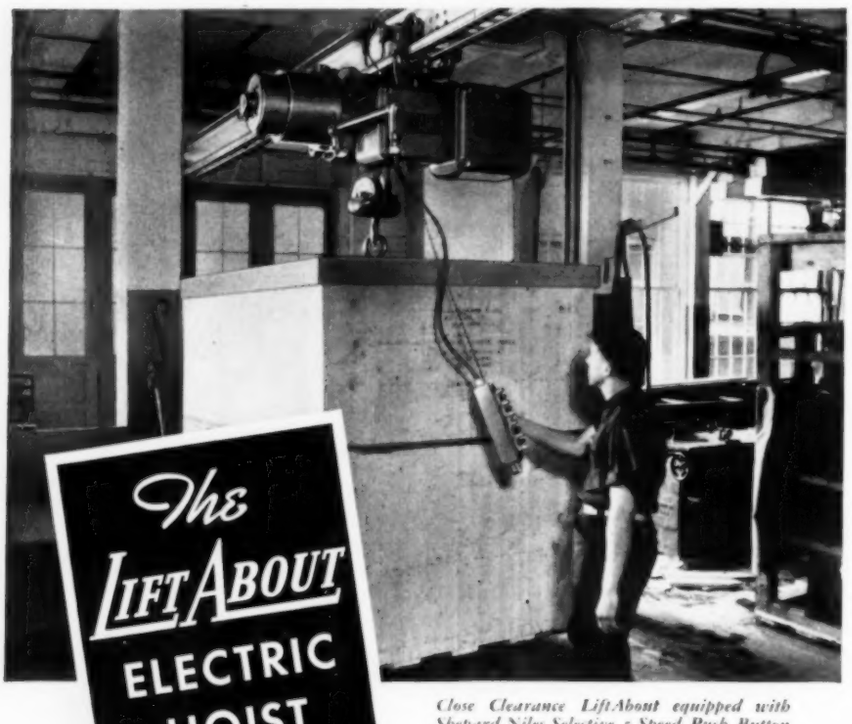
Fourth and concluding lecture of the series was held Thursday afternoon under the direction of Chairman Lee E. Everett, Kaukauna Machine Corp., Kaukauna, Wis., and comprised a discussion of core defects, their causes and remedies. Mr. Dietert described and illustrated more than 25 different types of core and casting defects. Following each lecture, those attending entered into a lively discussion of points brought out.

Arranges Extensive Technical Program

Some 17 separate technical sessions are scheduled for the forty-fourth annual meeting of the American Society for Testing Materials to be held at the Palmer House, Chicago, during June 23 to 27. About 100 technical papers and reports will be presented at the sessions. In addition the sixth exhibit of testing apparatus and related equipment and the fourth A. S. T. M. photographic exhibit on the general theme "Materials, Testing and Research," will be held.

Separate sessions of the meeting will be devoted to such topics as iron, ferroalloys; nonferrous metals (two sessions); steel, effect of temperature; fatigue of metals, corrosion; etc. Throughout the week of the meeting some 200 technical committees of the society are expected to meet. The entire first day will be devoted to committee meetings. First formal A. S. T. M. session scheduled for Tuesday morning, June 23, will be featured by the address of the president, Dr. W. M. Barr, chief chemical and metallurgical engineer, Union Pacific Railroad Co., who will speak on namely, "Speed, Specifications, and Safety." J. H. Van Deventer, president and editor of *The Iron Age*, will present an address on the subject, "Mobilizing Materials for Defense." Local arrangements for the meeting are in the charge of the Chicago committee, headed by E. R. Young, metallurgical engineer, Climax Molybdenum Co.; serving with him are some 50 other leading technical executives in the district.

In the two sessions devoted to nonferrous metals there are 10 technical papers and 8 committee reports, some of the reports being unusually important in view of their relation to national defense and also because they will contain important data from extensive co-operative research programs. The session devoted to iron includes 3 papers and there will be several committee reports. The topics covered are the strain hardening of gray cast iron, fatigue and static load test of a high strength cast iron at elevated temperatures, and Young's modulus and some related properties of graphitic materials.



Close Clearance LiftAbout equipped with Shepard Niles Selective 5-Speed Push Button Control and operating on Shepard Track.

Shepard Track (Patented)

UNWIELDY LOADS ARE HANDLED WITH EASE BY A SHEPARD NILES LIFTABOUT ● One hand does the lifting, no matter how clumsy the load, when a LiftAbout acts as a helper. Up a fraction of an inch, or the full height of lift—along the runway a few feet or the entire length and breadth of the plant—every motion under perfect control of the operator. There are numerous places in every plant where these untiring helpers should be helping to cut load handling costs.

Write for your copy of Catalog No. 127 for detailed information.

Two motor 5-Speed Master Switch

A COMPLETE LINE OF CRANES & HOISTS

SHEPARD NILES CRANE & HOIST CORP.

360 SCHUYLER AVENUE . . . MONTOUR FALLS, N. Y.

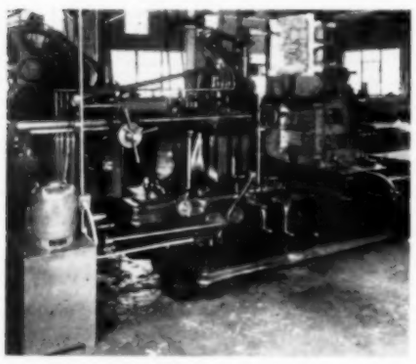
NEW EQUIPMENT and Supplies

Hand Lift Truck

Yale & Towne Mfg. Co., Philadelphia, has introduced a new hand lift truck, shown in the accompanying illustration, which is capable of handling loads up to 3500 pounds. Safety features are said to prevent tripping and flying handle. The compound articulating lift mechanism is designed to change the lifting ratio, flatten the lift curve and require less lifting effort. The hand grip, tubular handle shaft and lower handle casing are a single unit. The handle balancing mechanism keeps the handle in an upright position to prevent tripping and relieve the operator of handle weight. It is enclosed in the tubular handle shaft to protect it from outside shock. To prevent cornering in cramped quarters the truck features a 90 degree lift and full 180 degree steer, which provides maneuverability.

Duplicator

National Purchasing Co., Detroit, has designed a hydraulically operated duplicator for attachment to any standard type milling machine, boring mill or planer. It also may be attached to lathes and to machines equipped with high speed boring heads. It is claimed that the duplicator greatly increases the capacity and range of the machines, and performs operations usually considered possible only with single purpose special machines. Each duplicator is built to order. Due consideration is given to the scope and capacity of the original machine. Essentially the device is a duplicator. Follows the pattern or original it is re-



Why Our Industry is Equal to the "All Out" Effort

Ten years after the last war, there were in use some six hundred common alloys of brass and bronze.

Ten years later there were only one-sixth as many. *Now 23 alloys represent 80% of the tonnage produced.*

In this progressive[1] scientific simplification of nonferrous foundry practice, we see the key reason why the industry is said to be equal to the "all out" effort and demand.

The trend to standard specifications continues. A glance at your Manual of the Nonferrous Ingot Metal Institute will corroborate this. Use this manual more often in your efforts to develop maximum casting efficiency and economy.

[1]The first program for scientific control of ingot metal production was set up in and by the Ajax Metal Company, 44 years ago. Investigate Ajax Standard Alloys.

15 Standard Alloys by Ajax

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

★ **ASSOCIATE COMPANIES**

AJAX ELECTRIC FURNACE CORPORATION
Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTRIC COMPANY Inc.
Electric Salt Bath Furnaces
AJAX ELECTROTHERMIC CORPORATION
Ajax-Northrup Induction Furnaces for Melting, Heat-Treating Surface Hardening

★AJAX METAL COMPANY PHILADELPHIA
Established 1880

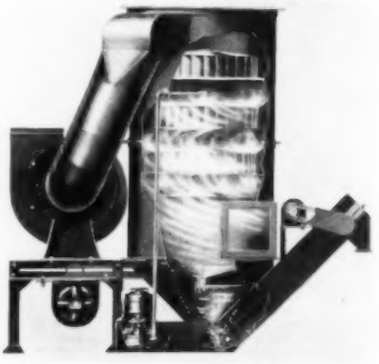
quired to copy and transmits to the cutting tools the control of the form. It traces the contour of the original pattern, die, mold or template and holds the cutting tools to the exact tolerances of the original.

Induction Motor

General Electric Co., Schenectady, N. Y., is marketing a new tri-clad capacitor motor designed to meet a large number of industrial applications. The new motor is said to feature modern appearance and better mechanical and electrical protection as well as protection against wear and tear. The new motor in two types is available with either ball bearing or sleeve bearing construction. One is designed particularly for applications requiring moderate starting torques, for example fans, blowers and centrifugal pumps. The other type is designed for compressors, loaded conveyors, reciprocating pumps and any other applications requiring high starting torque. The capacitors are mounted inside the end shield on the normal torque motor, while on the high starting torque motor, 1½ horsepower and larger, the capacitors are mounted in a compact case which is located on the top of the motor frame.

Dust Collector

The Claude B. Schneible Co., Chicago, has made available a new line of unit dust collectors in 2000 to 10,000 cubic feet per minute capacities. The new model comprises a fan; five spray curtain tower;



pump; settling chamber and sludge ejector conveyor. Collector tower is the conventional multi-wash design employing water in a cyclonic wash action to absorb dust and fumes on impingement plates and vanes. It is claimed that heavy particles are precipitated in the lower inlet cone of the collector. Fines are collected and washed back into the sludge chamber by the downward moving water spray curtain. The collector proper has no moving parts to wear, clog, burn or break. The sludge ejector conveyor operation at slow speed removes sludge from the precipitation chamber, dewaters it in the conveyor boot and discharges it into any convenient receptacle.

Heavy Duty Grinder

Hammond Machinery Builders, Inc., Kalamazoo, Mich., has increased its line of grinding and polishing machinery with a new 30-inch heavy duty grinder arranged to be driven at various speeds by a multiple V-belt drive. The grinder shown in the accompanying illustration is over size throughout and designed especially for extra heavy grinder applications where plenty of power is required.

BETTER VALUES
for Secondary
METALS
with
Stearns MAGNETIC
TYPE "L"
SEPARATORS

Reclaim your brass, aluminum, babbitt and other secondary metals from turnings, borings and metal refuse. Earn extra profits in such metals with this Stearns new and improved magnetic separator. A definitely profitable investment.

Our new Bulletin 46-B tells you about it. Write for your copy now.

SEPARATORS — DRUMS — ROLLS
CLUTCHES — BRAKES — MAGNETS

STEARNS
STEARNS-MAGNETIC MILWAUKEE
MAGNETIC MFG. CO.
662 So. 28th Street, Milwaukee, Wis.

Electric Hoist

Chisholm-Moore Hoist Corp., Tonawanda, N. Y., has added a new 1-ton capacity hoist to the line of light weight, portable, plug in type electric hoists. The new hoist, shown in the accompanying illustration, is available in five sizes: 250, 500, 750, 1000 and 2000 pounds. The new

hoist is available with hook suspension for quick, easy portability, or with a trolley attached for overhead conveyance. Special heavy duty, high torque motors are supplied for either 110 volt lighting circuits, or 240 or 440 volt power lines. Double plate sealed, permanently lubricated ball bearings are provided at all bearing points.

Metal Cutting Saw

J. D. Wallace & Co., 134 South California avenue, Chicago, recently has developed a metal cutting saw, shown in the accompanying illustration for cutting bar stock, rounds, angles, tubes and sheets of all kinds of metal and many re-

fractory materials. Operating back and forth in the sturdy radial arm the high speed gear motor drive unit is fitted with either 3/32-inch thick abrasive wheels, or special metal cutting saw blades. The radial saw will cut steel, iron, brass, aluminum, duralumin, copper, high speed steel and all kinds of alloys. Wheels and blades have a maximum cutting depth of 4 inches and will handle work within the capacity of the 1 or 2 horsepower motors. The illustration, taken from back of the machine, shows the coolant pump, vise carrier and rapid acting vise, available accessories. In addition to straight cut off work the machine may be set up quickly for angle cuts and miters.

Rubber Lined Valve

B. F. Goodrich Co., Akron, O., has developed a new combination outlet and overflow valve for pickling tanks. The valve, installed entirely outside the tank, employs a wheel and screw attached to the valve stem to raise and lower the valve disk. The valve is lined completely with rubber and is fitted with a low-cost replaceable, resilient rounded disk which snaps over a circular plate at the lower end of the stem. That is said to provide an absolute seal when brought into contact with the rubber covered seat ring.

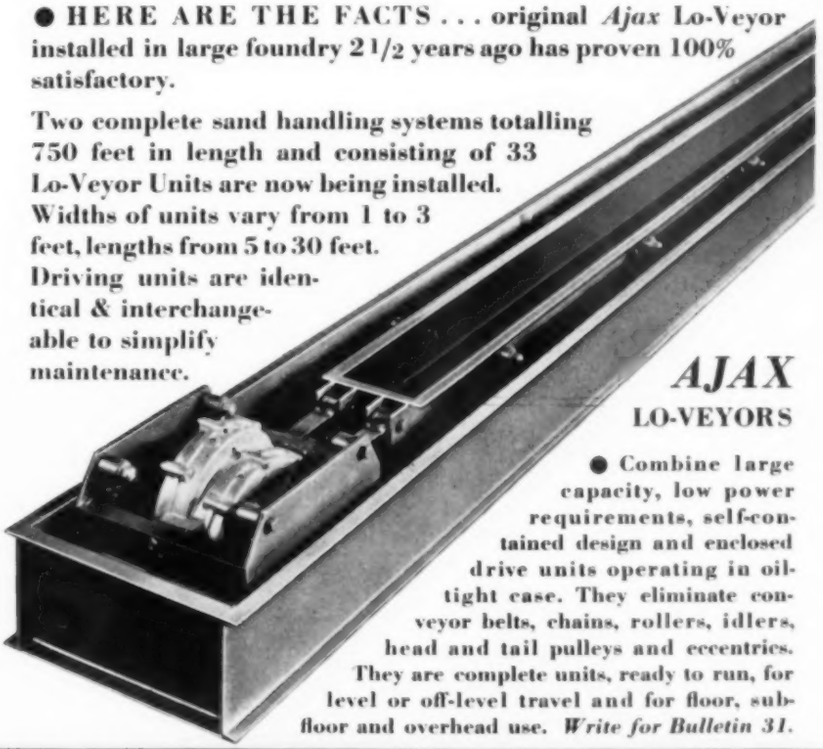
After 2½ years test . . . .

PRODUCTION FOUNDRY IN MIDDLE WEST

INSTALLS AJAX LO-VEYOR SAND CONVEYING EQUIPMENT

● HERE ARE THE FACTS . . . original *Ajax* Lo-Veyor installed in large foundry 2 1/2 years ago has proven 100% satisfactory.

Two complete sand handling systems totalling 750 feet in length and consisting of 33 Lo-Veyor Units are now being installed. Widths of units vary from 1 to 3 feet, lengths from 5 to 30 feet. Driving units are identical & interchangeable to simplify maintenance.



AJAX LO-VEYORS

● Combine large capacity, low power requirements, self-contained design and enclosed drive units operating in oil-tight case. They eliminate conveyor belts, chains, rollers, idlers, head and tail pulleys and eccentrics. They are complete units, ready to run, for level or off-level travel and for floor, sub-floor and overhead use. *Write for Bulletin 31.*

AJAX FLEXIBLE COUPLING CO. WESTFIELD, N.Y.
204 ENGLISH ST.
MANUFACTURERS OF VIBRATING SCREENS, PACKERS AND FLEXIBLE COUPLINGS

NEXT TIME
Order by Name
Tri-Ply
Foundry Riddle

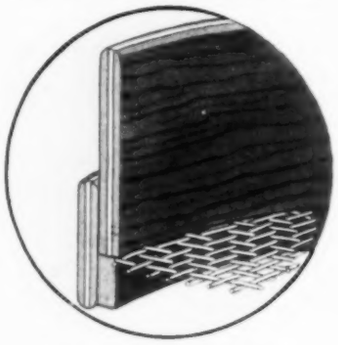
3-PLY FRAME
An *exclusive* feature. Many times stronger than materials usually found in foundry riddles. One BIG reason why "Tri-Ply" riddles last longer.

SPLIT-PROOF CONSTRUCTION
3-ply frame material cannot split and "run" with the grain. Another reason why "Tri-Ply" riddles will give added months of useful service.

NO CROSS WIRES
Special construction, shown below, makes cross wires unnecessary. This feature adds materially to screen life through elimination of extra abrasion.

LONGER LIFE
They not only look better ("Tri-Ply" riddles are all mahogany stained), but they last longer because of many exclusive, patented construction features.

TRI-PLY SPECIAL CONSTRUCTION



Made in all meshes and three sizes—16" 18" 20" diameter

Stocked by leading foundry supply houses

SEYMOUR & PECK CO.
P. O. Box 5609 Chicago, Illinois

TRI-PLY RIDDLES
COST NO MORE

Film Dryer

The Harry W. Dietert Co., Detroit, has added an infra red-film dryer to the company's line of spectrographic analysis equipment. The infra red-film dryer shown in the accompanying illustration will dry a 16-

inch length of 35 millimeter film in 50 seconds without curling the film. The wet film is stretched around a glass form containing an infra red lamp. A motor driven fan in the base of the dryer forces warm air around the outside of the glass. Thus the film is dried on the inside and on the outside. By opening two doors the operator has easy access to the glass form holding the film. The air entering the chamber is filtered to prevent a deposit of foreign specks on the wet emulsion. An electric timer starts and stops the blower and cuts off the current to the lamp after a predetermined time period.

Goggle Lens

Univis Lens Co., Dayton, O., recently has placed on the market a new safety goggle lens made of a special nonshattering material with less than half the weight of glass. The lens is available in two curved and one flat style. They are approximately 3 millimeters thick and may be obtained up to 51 millimeters maximum diameter. It is claimed that the lens withstands to a highly satisfactory degree the impingement of grit and hot metallic particles from grinding operations, splashings of molten metal, and flying particles of hot metal in welding operations.

Sweat Band

Jackson Electrode Holder Co., Detroit, announces two new ruggedly constructed sweat bands consisting of fine pore cellulose sponge securely stitched to a fabricoid band with an inner lining of cork. One type is a general purpose band, claimed to prevent sweat running into the eyes. It is adjusted easily with a long-lasting ½-inch wide elastic band. The second is intended for use with most eye shields made by that company. It simply is snapped inside the band. It is stated that both bands, light, cool, comfortable, can absorb more than 15 times their weight in moisture. Both are sanitary, quickly cleaned by letting water or any safe antiseptic solution run through the sponge cellulose.

Drafting Machine

V. & E. Engineering Co., 758 South Fair Oaks, Pasadena, Calif., has developed a new drafting machine in which manual and automatic indexing are combined in one unit. Positive band tightening device is simple in operation and will not work loose. Smooth elbow brake is adjusted readily by a single thumb screw to prevent sliding on an inclined table. Arms are so articulated with the brackets that the head of the machine adjusts itself to irregularities in the drawing surface. The head can be raised high off the table to facilitate positioning the drawing paper. Zero reading on the machine readily can be set for a base line of any orientation which may be required.

Crane Limit Stop

Cutler-Hammer, Inc., 315 North Twelfth street, Milwaukee, has introduced a main circuit crane safety limit stop to prevent over travel of the crane hook when hoisting. The new device, shown in the accompanying illustration, operates through a counter weighted lever and a suspended reset weight. As the hook approaches the limit of travel the reset weight is lifted and the counter weight trips the switch. A quick make and break mechanism opens the normally closed power contacts to disconnect the motor from the line and closes another set of contacts to connect a resistor across the motor circuit, thus establishing smooth, quick, dynamic

braking. When the limit stop is in the tripped position, a by-pass circuit permits backing out of the limit at slow speed.

FOUNDRY ACTIVITIES

NATIONAL Bronze & Aluminum Foundry Co., Cleveland, has installed three new heat treating furnaces. Their capacity is 38,000 pounds daily, and operating 7 days a week, will be capable of turning out over a million pounds of heat treated castings a month. Since the first of the year, the company has built an addition to its cleaning room, and also a large addition to its molding floor where heavy castings such as diesel engine crankcases, oil pans, etc., are molded.

* * *

Western Foundry Co., Wingham, Ont., was damaged by fire and is being rebuilt.

* * *

Hillsdale Foundry Co., Hillsdale, Mich., has been organized by Wilbur S. Walters, Lewis street.

* * *

Paul Pufahl & Son Foundry Co., Minneapolis, is building a two-story plant 90 x 154 feet.

* * *

Manhattan Foundry & Model Co. has changed its name to the Eastern Casting Corp. The company is operating at the same address, 542 West Twenty-seventh street, New York, and is under the same management.

* * *

Modern Pattern Co., Minneapolis, Ralph C. Hitchcock, manager, has given general contract to R. H. McGuffie for a one-story plant addition.

* * *

Laetz Foundry Co., 800 Woodside avenue, Bay City, Mich., has constructed an addition to its foundry, giving 1700 square feet additional

RAW MATERIAL PRICES
May 21, 1941

Iron	
No. 2 foundry, Valley	$24 to 24.50
No. 2 Southern Birmingham	20.00
No. 2 foundry, Chicago	24.00
No. 2 foundry, Buffalo	24.00
Basic, Buffalo	23.00
Basic, Valley	$23.50 to 24.00
Malleable, Chicago	24.00
Malleable, Buffalo	24.50
Charcoal iron, furnace	28.00
Coke	
Connellsville beehive premium	$7.25 to $7.60
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	11.50
Scrap	
Heavy melting steel, Valley, No. 2	$19.00
Heavy melting steel, Pittsburgh, No. 2	19.00
Heavy melting steel, Chicago, No. 2	17.75
Stove plate, Buffalo	19.00
Stove plate, Chicago	16.00
No. 1 cast, mchy., New York	
No. 1 cast, mchy., Chicago	21.00
No. 1 cast, Pittsburgh	21.00
No. 1 cast, Philadelphia	24.00
No. 1 cast, Birmingham	19.25
Car wheels, iron, Pittsburgh	.....
Car wheels, iron, Chicago	.....
Railroad malleable, Chicago	.....
Malleable, Buffalo	.....
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	12.25
Straits tin	52.25
Aluminum, 99 per cent	17.00
Aluminum, No. 12 (Secondary, standard)	16.00
Lead, New York	5.70
Antimony, New York	14.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill	7.25

DON'T OVERLOOK this 5-POINT SAVING on CORE-MAKING COSTS—

Only J-M Transite Core Plates provide all these important features that mean faster, more economical production for any foundry:

EASIER HANDLING: Transite Core Plates weigh only about one-fourth as much as iron and steel. Operators can handle more at a time

HIGH CORROSION-RESISTANCE: Made of asbestos and cement, they are unusually resistant to corrosion.

STRENGTH: Transite Core Plates' unusual shock resistance offers a high degree of protection against cracking and breaking

REDUCED WARPAGE: Transite Core Plates have a warpage tolerance as low as cast iron and much less than plates cut from ordinary steel stock

ECONOMY IN SERVICE: The reasonable price, low handling costs and long life of Transite Core Plates are cutting production costs for leading foundries all over the country

MAIL COUPON FOR PRICES AND DETAILS

JM PRODUCTS

Johns-Manville TRANSITE CORE PLATES

JOHNS-MANVILLE,
22 East 40th Street, New York, N. Y.

Please send me the facts on Transite Core Plates and prices on plates of the following sizes. No obligation, of course.

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.....x.....x..... .....x.....x.....

Name_____

Company_____

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City_____ State_____

NO METAL Shortage !

TAMA-STONE
"The Perfect Pattern Compound"

Tamastone Pattern Compound makes it possible to convert loose and metal gated patterns into match plate production. Defense orders can be speeded up 400% or more—at exceedingly low cost!

Check the following time savers

TAMMS NEW LIQUID PARTING

Actual foundry production prove this superior product speeds production! For quick use, spray on pattern—dry with air hose! Keeps sand from adhering to pattern. Tamms Liquid Parting will not "build-up" on pattern—gives exact detail every time. Many report full day runs without recoating!

METALINE—To be applied over wax fillets or Modeling wax build-ups. Forms Metallic coating that will not soften when Tamms Liquid Parting is applied. Also prevents warm sand from adhering to waxed places on patterns.

PLASTIC METAL FILLER

New plastic compound made for filling deep gouges and rough places on metal patterns. Put damaged or uneven patterns in perfect working condition quickly and easily.

Write for SAMPLES!

Foundry Division
TAMMS SILICA CO.
228 N. La Salle St., Chicago, Ill.

floor space. The expansion was made necessary by the increased volume of work received. Chris Laetz is foundry superintendent.

* * *

Federal Mogul Corp., Detroit, has let general contract for an addition to its foundry.

* * *

J. Berlenbach, Quakertown, Pa. will build a one-story foundry to cost over $40,000 with equipment.

* * *

Newark Brass & Foundry Corp., 320 Schuyler avenue, Kearny, N. J., will build a one-story 50 x 100-foot foundry.

* * *

Monarch Pattern Works recently has moved from 6602 Walton avenue, Detroit, to 5680 Twelfth street, Detroit. S. Warwick is owner.

* * *

Acme Pattern & Tool Works Inc., 232 North Findlay street, Dayton, O., is building a foundry 130 x 300 feet, to cost $300,000.

* * *

Pioneer Alloy Products Co. Inc., 16601 Euclid Avenue, Cleveland, is building two additions, 25 x 45 and 25 x 60 feet.

* * *

Continental Roll & Steel Foundry Co., 144th street, East Chicago, Ind., is building a two-story plant addition at a cost of $40,000.

* * *

Capitol Foundry & Mfg. Co., formerly located at 1800 West Colfax avenue, Denver, has moved to 4312 Decatur street.

* * *

Lindgren Foundry Co., Batavia, Ill., is building a one-story foundry addition 65 x 80 feet, to cost about $40,000.

* * *

Youngstown Foundry & Machine Co., Youngstown, O., has purchased three acres of land adjoining its plant for use in expansion if needed.

* * *

Philadelphia Bronze & Brass Co., Twenty-second and Market streets, Philadelphia, has let general contract for a two-story addition 55 x 60 feet, to cost $40,000.

* * *

Hammond Brass Works, 1844 Summer boulevard, Hammond, Ind., is building an addition 50 x 50 feet to its brass foundry, to cost about $5000.

* * *

Theo. Kupfer Foundry & Machine Co., Madison, Wis., has moved its plant and offices from East Mifflin street to new quarters at 149 Waubesa street.

* * *

Marsh Valve Co., Dunkirk, N. Y. has begun operations in its new foundry. The building, exclusive of melting room, sand rooms, etc. is 40 x 100 feet and is equipped with the latest and most up-to-date equipment for its production.

* * *

Eastern Iron & Metal Co., 2210 East Eleventh street, Los Angeles, has been granted a building permit to construct a foundry and smelter 75 x 100 feet which will cost $10,000.

* * *

H. C. Weiskittel Co., Inc., 4901 Philadelphia road, Baltimore, is building a one-story 75 x 137-foot foundry addition to cost approximately $40,000.

* * *

Sandusky Foundry & Machine Co., 509 West Market street, Sandusky, O., is building a 60 x 137-foot expansion at a cost of $20,000. Devereaux Lake is president.

* * *

Cooper Alloy Foundry Co., Elizabeth, N. J., is building a foundry to cost $25,000 and a pattern storage building to cost $11,250 at Hillside, N. J. Harry Cooper is president.

* * *

Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich., has ordered a 30-ton per hour hot metal duplexing electric arc furnace from the Hydro-Arc Furnace Corp., Chicago.

* * *

Building permit has been issued for construction of an addition 28 x 74 feet to the foundry building of the Socal Foundry Co., 1985 East Sixteenth street, Los Angeles, and to cost $2000.

* * *

Tri-Metals Foundry Co. is the firm name under which John Thomas Reed and Leonard A. French have obtained certificate to conduct business at 315 West avenue Thirty-three, Los Angeles.

* * *

Harlow B. Salter and J. J. Rardin, officers of Fisher Brass Inc., Marysville, O., will build a foundry plant with 6000 square feet of floor space at Bellefontaine, O., for production of rough plumbing fixtures, globe valves, etc. Homer B. Fuson will be superintendent.

* * *

Midland Foundry & Machine Co., Midland, Ont., has been formed by James N. Bicknell and J. Pope, Toronto, Ont., and has bought the Hanley machine shop which will be remodeled and new equipment added for manufacture of car wheels, cranes, derricks, etc.

* * *

Index of foundry equipment orders for April, 1941, according to a recent report of the Foundry Equipment Manufacturers Association, Cleveland, was 377.2 as compared with 315.2 in March. Index of orders for new equipment was 405.3 and for repairs 292.5. The index of 100 represents the monthly average of reported sales to metalworking industries during 1937-38-39.

Publishes Red Book

With Great Lakes shipping beginning the most active season in its history, many changes of major importance are noted in the 1941 edition of *The Great Lakes Red Book* just issued at Cleveland, by The Penton Publishing Co. This vest pocket directory is in its thirty-eighth annual edition.

In addition to the names of more than 1500 vessels registered on the Great Lakes, both American and Canadian, with the names of owners, operators, captains and engineers, the Red Book contains a complete directory of shipbuilding yards in the Great Lakes area with executive personnel and other pertinent information. An alphabetical list of all ships, an index of the capacity of ore carriers and a complete port directory are also included.

Bound in paper, 4¾" x 3", 170 pages, price per copy in the United States and Canada $1.00.

Makes Large Casting

The 68-ton casting shown in the accompanying illustration is one of the largest ever made in the Ansonia, Conn. foundry of Farrel-Birmingham Co. Inc. The casting made of Meehanite forms the bed of a stone crusher capable of reducing 4 x 4 x 5-foot pieces of rock to crushed stone for highway and building construction. It was made for Earle C. Bacon Inc., New York, and installed at the quarry of the Kingston Trap Rock Co., Kingston, N. J.

Molding of the crusher bed was started in the Farrel-Birmingham foundry on Jan. 22 and a month later it was cast. Seventy-five tons of metal were melted for the casting and it was poured simultaneously from two ladles of 30 and 35 tons capacity, with a third ladle of 10 tons capacity finishing the pouring.

Only 10 minutes were required to pour the casting. It was allowed to remain in the sand for two weeks to cool properly. Another week was required to shake it out and clean it. Altogether, 29 men spent a total of 588 man-hours in the production of the casting.

New Saw

Skilsaw Inc., Chicago, has added a new improved 6-inch saw to its line of portable electric saws. The new model for heavy duty service is more compact, claimed to be ideal for the carpenter builder on small homes, garages and for general remodelling as well as for intermittent maintenance except flooring. May also be used with abrasive disks for scoring tile, concrete, etc., and for tuck pointing. The saw cuts to a depth of 1⅞ inches, will rip and crosscut hard wood up to 1 inch, crosscut dressed pine lumber up to 2 inches, bevel cut lumber 1 3/16-inch thick at 45 degrees. The blade has a free speed of 3400 revolutions per minute and is protected by an automatic telescopic guard rotating on ball bearings. The base is readily adjusted for depth and bevel cutting.

Iron Fire Brick Co., Ironton, O., has completed a new building to be used as a dry floor for refractories. The new building will double the company's special shape capacity.

This 68-ton gray iron casting for a crusher bed required approximately a month for making the mold. Seventy-five tons of metal were used to pour the casting which required only 10 minutes. Casting remained in the sand for two weeks, and cleaning took one week.

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A. A. Wickland

—Advt.

Obituary

Charles B. Jahnke, 54, president and general manager, Cooper-Bessemer Corp., Mt. Vernon, O., died recently from a heart attack in that city. After graduating from the engineering school of Cincinnati University, Mr. Jahnke became head of the experimental division, Fairbanks, Morse & Co., Beloit, Wis., and later works manager and chief of the company's engineering division. In 1931 he became an engineering counsel for International Harvester Co., Chicago, and 4 years later joined Cooper-Bessemer, where he was chief engineer from 1935 until last December when he was elected president and general manager.

* * *

Rudolph J. Ketz, 56, treasurer, Pressure Castings Inc., Cleveland, for 3 years, died recently in that city.

* * *

J. Watson Owings, 56, metallurgist, Meehanite Metal Corp., Pittsburgh, died recently in Spokane, Wash. Mr. Owings had been with the company since 1936 and had spent his entire business career in the foundry industry.

* * *

Oscar B. Mueller, 70, retired president, Mueller Brass Co., Port Huron, Mich. died recently in Bradenton, Fla. Mr. Mueller retired from active association with the firm in 1936 and had lived in Bradenton since that time.

* * *

Warren H. Walker, 61, vice president, Walker Mfg. Co., Racine, Wis., died May 7 in Rochester, Minn. Mr. Walker with his brother Willard, founded the manufacturing company in 1910.

* * *

Alexander Jarecki, 75, president of the Jarecki Mfg. Co., Erie, Pa., and for many years prominent in the American malleable iron industry, died recently at his home. A son, Carl A. Jarecki, secretary of the company, died 3 weeks previously.

* * *

August Heckscher, 92, New York capitalist and philanthropist, president of the Central Iron & Coal Co., Central Foundry Co. and vice president of the Eastern Steel Co., died recently at his Mountain Lake home at Lake Wales, Fla.

* * *

Thomas H. Gartland, 84, retired Cleveland foundryman, died May 4 in Tampa, Fla. Mr. Gartland established the old Gartland Foundry Co., now the Superior Foundry Co., Cleveland, helped organize the old Interstate Foundry Co., and had charge of designing the old Best Foundry Co., Bedford, O. He later started the Gartland-Carroll Foundry Co., Sandusky, O., and the Gartland-Toledo Foundry Co., Toledo.

* * *

Charles B. Nolte, 55, president, Crane Co., Chicago, since 1935, died unexpectedly of a heart attack at his home in that city, recently. Mr. Nolte was born in Mattoon, Ill., and graduated from the University of Illinois in 1909.

* * *

George B. M. Rogers, secretary and treasurer, Excelsior Foundry Co., Belleville Ill., died in his home in that city recently. Mr. Rogers was a pioneer in the foundry industry and until a few years ago, when he retired on account of ill health, was president of the First National Bank, Belleville.

* * *

William T. Randall, Philadelphia sales engineer, Pangborn Corp., Hagerstown, Md., died suddenly April 14 while on an Easter visit to his summer cottage at Pittsfield, Vt. Mr. Randall was 57 years old. He joined the Pangborn Corp. as Philadelphia representative in 1919 and has been widely known in that district for his services to the foundry and process industries.

* * *

James Cooper Neville, 56, stock broker and one time prominent in the foundry industry, died recently at his home in Flushing, N. Y. Mr. Neville was born in London and was brought to Syracuse, N. Y. at the age of three. About 1914 he became secretary of the Syracuse Malleable Iron Works and later rose to the presidency of that company. He later was made president of the company's successor, the Smith Wheel Inc.

* * *

Dr. Charles Russ Richards, 70, president emeritus, Lehigh University, Bethlehem, Pa., died April 17. Dr. Richards was born in Clarks Hill, Ind., and was a graduate of Purdue University. He was dean of the college of engineering, University of Nebraska from 1907 to 1911, and then became head of the department of mechanical engineering and later dean of engineering, University of Illinois. He was president of Lehigh from 1922 to 1935 when he retired.

* * *

Andrew W. Seacord, 55, director of manufacturing, International Harvester Co., Chicago, died May 15 in Passavant hospital in that city after a year's illness. Mr. Seacord was a graduate of Cornell University in 1909 and went to work for the company at its Auburn, N. Y. plant in 1911, and rose to the post of superintendent in 1920. He went to Chicago in 1924, working in the manufacturing division until 1937 when he was made manager of the

company's country-wide manufacturing.

* * *

Francis Edwin Brown, 67, chairman of Messrs. David Brown & Sons Ltd., and its associated companies, Huddersfield, England, died at his home at Somerfield, Holmfirth. Mr. Brown joined the company, which was founded by his father in 1860, as an apprentice in 1889, and the business in its present form was originated by him. He was well known throughout the engineering industry in many parts of the world and was a pioneer in the development of machine cut gearing.

Look Over Castings And Patterns

Patterns and castings, gray iron, steel and bronze prepared by foundry and pattern-shop apprentices in the Cleveland district were laid out in the Cleveland Trade school April 23 and 24 for inspection by a group of judges. Those selected by the judges as No. 1, 2 or 3 were forwarded to New York, to enter a national contest sponsored every year by the American Foundrymen's association and featuring patterns and castings made by apprentices from various sections of the country. The patterns were laid out under the direction of Frank C. Cech, for many years head of the patternmaking division, Cleveland Trade school. The castings were displayed in a class room connected with the school foundry under the direction of Instructor James G. Goldie. Committee selected to judge the patterns included Vincent Sedlon, Master Patterns Co.; Edward Guttman, Standard Pattern Works; Frank Smith, Forest City Foundries Co.; Walter Seebeck, Western Pattern Works; Pat Dwyer, THE FOUNDRY; and George J. Gedeon, Aluminum Co. of America. Foundrymen selected to appraise the castings included Pat McGuire, National Defense Training; William Shilling, Atlas Foundry Co.; William Feth, Forest City Foundries Co.; Pat Dwyer, THE FOUNDRY; William Manwell, Fulton Foundry & Machine Co.

In the local contest the first place in gray iron casting was awarded Chester Blacksmith, Bowler Foundry; second place to William Wehagan, Westinghouse Electric & Mfg. Co.; and third place to Michael Slivka, Hill-Acme Co. In the nonferrous group first place was taken by John Jasso, Wellman Bronze & Aluminum Foundry Co.; second place by Eugene Nargorski, Cleveland Trade School and third place by Dan Bednerski, also a pipil at the school. First place in the steel casting group was awarded Robert Bina, Crucible Steel Co., second place to Robert Miller, Crucible Steel Co.; and third place to Peter Opacick, West Steel Casting Co. First place among the patternmaking contestants was awarded Albert Jazbiniski, Western Pattern Works; second place to John Burczky, Marter Pattern Works, and third place to Walter Zernechel, Hill-Acme Co. Winners of the first and second prizes attended classes and were placed by the Patternmaking Division, Cleveland Trade School.

Judges at work deciding winners at the Cleveland district apprentice contest. Left to right: Pat Dwyer, The Foundry; William Shilling, Atlas Foundry Co.; Pat McGuire, National Defense Training, and William Feth, Forest City Foundries Co.

Bureau of Mines, Washington, recently has published the annual report of its metallurgical division for the fiscal year 1940.

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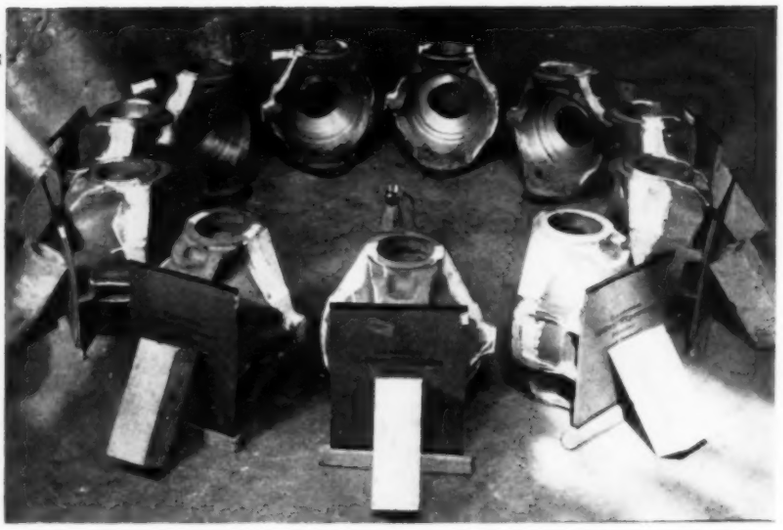

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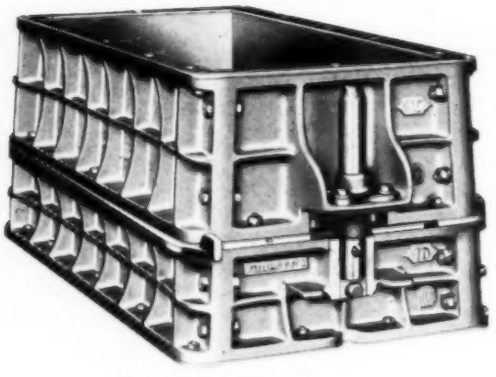

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